BLUE BOOK

STANDARD TIME DATA

page 100

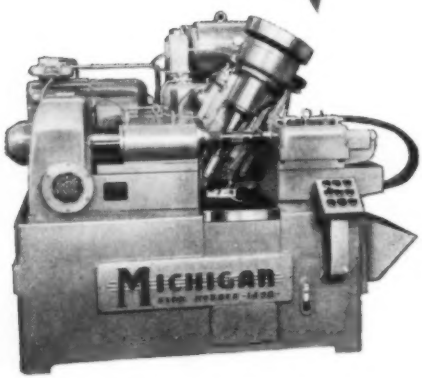
ALSO IN THIS ISSUE:

How to Fasten Carbide to Steel
Part 1: Carbide Grade Selection

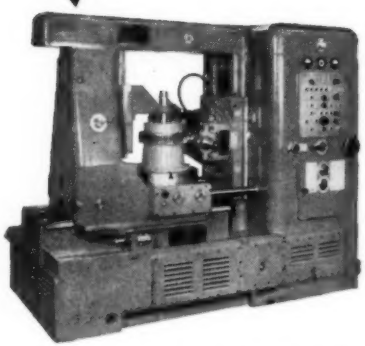
Prikos on "Tips on Tooling for Long-Run Production"

Why EUROPE wanted U.S. hobbers

Why WE added LORENZ (GERMAN) designs



Michigan 1458B hobbers are available for gears up to 12" OD and 4¼" face width. Ask for Bulletin #1458-61.



Michigan-Lorenz hobbers are available in 3 styles for gears up to 24" capacity. Ask for Bulletin #ML-61.

IN EUROPE, industry has extensively switched to mass production methods and equipment. This calls for machines that will stand the gaff day after day in continuous production. One major company decided to test all hobbers . . . European and American. The MICHIGAN 1458B hobber was found the ideal machine despite higher cost than for European machines. It gave top output, high accuracy, minimum downtime, freedom from service troubles. Since then, Europe has been a repeat buyer of 1458B hobbers.

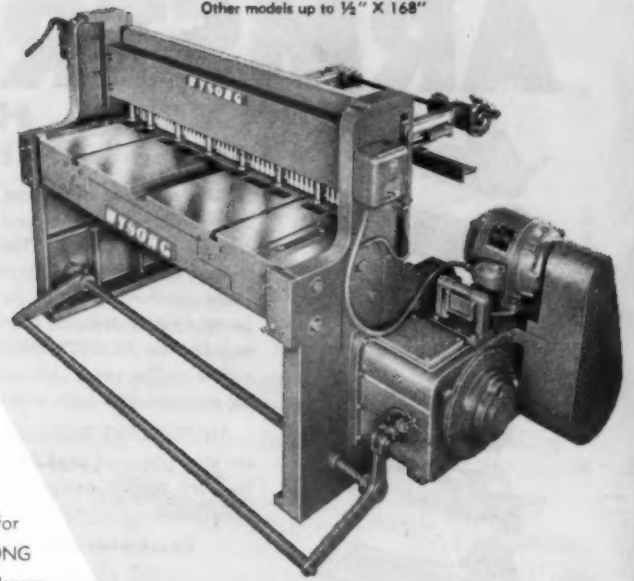
If you want to cut your production hobbing costs, you too will find the 1458B the machine that can really do it.

IN THE UNITED STATES, gear producers who needed more versatility with high accuracy and low cost have eyed European hobbers for some time. Michigan Tool Company joined them and found that the design of the German Lorenz line of hobbers came closest to meeting U.S. needs. An engineering arrangement was made and today, as the MICHIGAN-LORENZ line, these versatile hobbers are available as American-built machines produced by Michigan Tool Company.

If you need top versatility with accuracy and ruggedness—you too will find MICHIGAN-LORENZ hobbers (and shapers) will cut your costs.

MICHIGAN TOOL COMPANY, 7171 E. McNICHOLS RD., DETROIT 12, MICHIGAN

MODEL 1252—Capacity 12 ga. X 52"
Other models up to ½" X 168"



New standards of accuracy are now demanded in more and more shearing operations. Frequently, blanks sheared to yesterday's accepted tolerances are today's costly rejects.

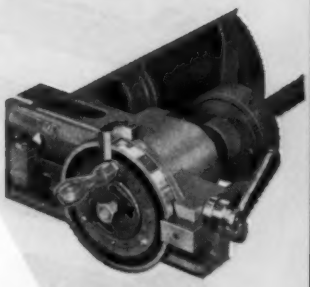
Can you meet today's demand for accuracy? You can with a WYSONG shear. It is the only line of shears equipped with a friction lock back gauge graduated to .001". Precision Ground Acme screws enable you to set the gauge on the exact thousandth that you want.

A new gibbing system, with non-metallic, score proof ways and ½° angular travel, permits closer settings of the gibs and the blades. These important factors contribute to the unsurpassed accuracy that you get with a WYSONG shear.

To meet modern demands, get a truly modern shear.

"Buy a **WYSONG** - it's **MILES** ahead"

Saving thousands ... Shaving thousandths!



This gauge is standard equipment on all models normally equipped with rear-operated back gauge. Available at extra cost on models normally equipped with front-operated back gauge.

WYSONG

WYSONG & MILES COMPANY
635 Fulton Street
GREENSBORO, N. C.

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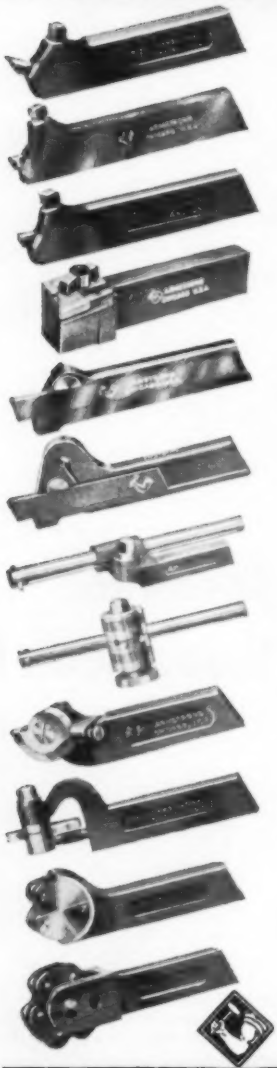
A Correct Tool for Every Lathe Operation



You can save time (and money) by ensuring that your machine tools are equipped with *adequate numbers* of the correct ARMSTRONG Tool Holders. The ARMSTRONG System of Tool Holders includes correctly designed tools for *every* standard operation on lathes, shapers, and planers, and for many operations on turret lathes and screw machines. By utilizing the ARMSTRONG System of Tool Holders, you can reduce tooling costs, eliminate down time in tooling up, operate your machine tools at maximum feeds and speeds.

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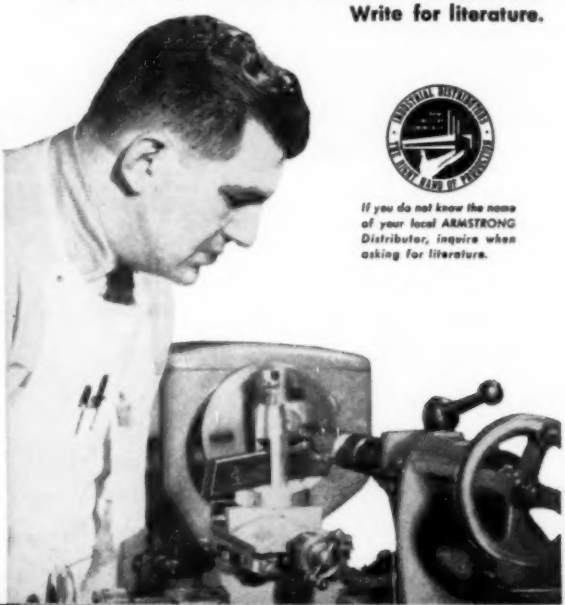

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Machine and Tool BLUE BOOK

for the Men of Action in Metalworking

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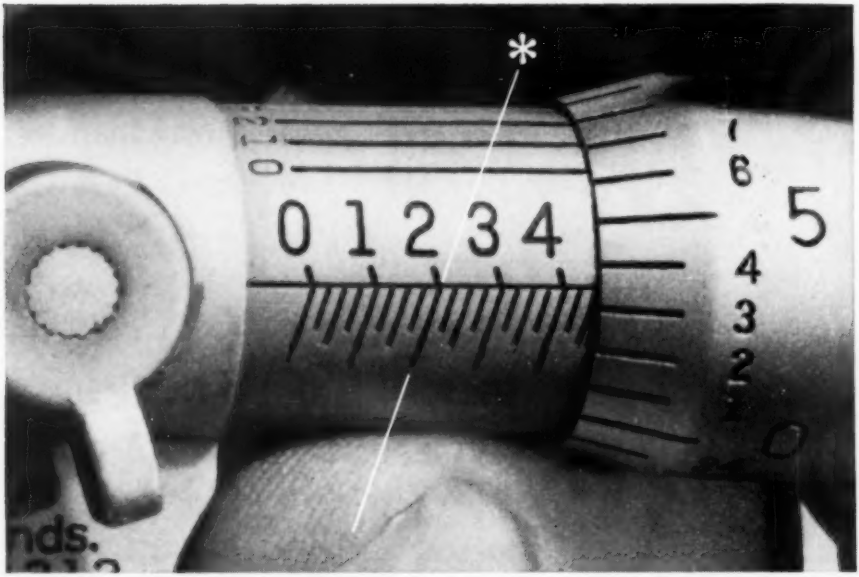

New B&S No. 1011 Micrometer has slanting barrel graduations – thimble that converts to "friction" or "fixed" type – handy thumb-operated wrap-around lock – satin finish – easy zero setting – carbide faces – dependable B&S precision. Range: 0–1", in 10-thousandths.

New *slant* on Brown & Sharpe mikes cuts out 25-thousandth errors!

See the barrel graduations on this new Brown & Sharpe mike? They're *slanted.*

This means they can't hide under the edge of the thimble the way right-angle graduations do.

They eliminate the embarrassing and expensive 25-thousandth errors possible in an ordinary mike when only one-fifth of a turn of the thimble hides the graduation.

Protect your workmanship as well as your eyes! Ask your Brown & Sharpe dealer for the new B&S No. 1011 Micrometer with *slanting* graduations. No charge for personalized initials. Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Brown & Sharpe PRECISION CENTER

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Features In This Issue

STANDARD TIME DATA—FOR "GUESS-LESS" ESTIMATING is more than an explanation of the why, when, and how of a method of estimating—it is a plea for a systematic approach to work standards and machine estimating. Drawing on many years of practical experience as a management consultant, author Ed Cyrol concludes that, "The plant that is not using properly engineered work standards will have labor costs that are at least 25% too high!" .....**Page 100**

HOW TO FASTEN CARBIDE TO STEEL will be described in detail in a series of articles beginning this month. Author G. A. Morrison this month outlines what the methods are and reviews the affect carbide grade has on the performance of the finished part—be it cutting tool, wear part, or component part ..**Page 115**

USE NUMERICALLY CONTROLLED MACHINES? SPEED MACHINE SETUP WITH ONE REFERENCE POINT. This article describes how a user solved the point-zero problem with a fixture **Page 124**

APPLYING THE NEW ADJUSTABLE CARTRIDGE UNITS and the application of special tooling are analyzed by Ray Ruckel in his column on "Cutting Tools." The adjustable cartridge units are receiving considerable attention as a means of reducing setup and machining times .....**Page 139**

THIS MONTH IN METALWORKING is a new BLUE BOOK department that tells what people and companies are doing. Look for it every month, up front. .....**Page 10**

DAKE

Movable Frame Presses

...make awkward, hard-to-handle jobs easy...

Difficult straightening, pressing, clamping, forming, and testing operations are made simple with this versatile Dake hydraulic press. The entire pressing frame can be rolled out of the way to permit the placing of large, heavy, or bulky work on the pressing table. And the powerful, self-contained workhead is movable in every direction—left, right, up, down—to permit positioning over the point where pressing force is required.

Standard model, single acting, movable frame presses are available for air or electric operation in capacities from 25 tons to 150 tons—other models and designs in capacities from 200 tons to 300 tons. For detailed information, send for Catalog 424.

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WITH THE EDITOR :

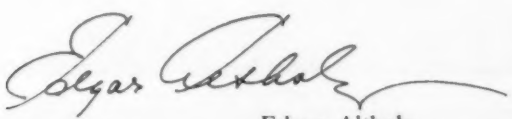
Read the Ads!

Quite likely, there are as many ways of reading a magazine as there are magazine readers. Some readers will start at page one and work their way methodically onward. "Left-handed" readers will do just the reverse, starting at the back. Others will go through the advertisements, then tackle the articles. Still others will habitually read certain editorial sections first. And so on.

Whatever the reading idiosyncrasy, advertisements in the technical magazine can be—and are—as informative and as helpful as the editorial material, and form a vital part of the reader's diet. In fact, if the exigency of time were to preclude any extensive reading, mere perusal of the advertising pages would be invaluable in keeping one abreast of his industry. The ads in BLUE BOOK constitute a veritable department store of metalworking machinery and equipment.

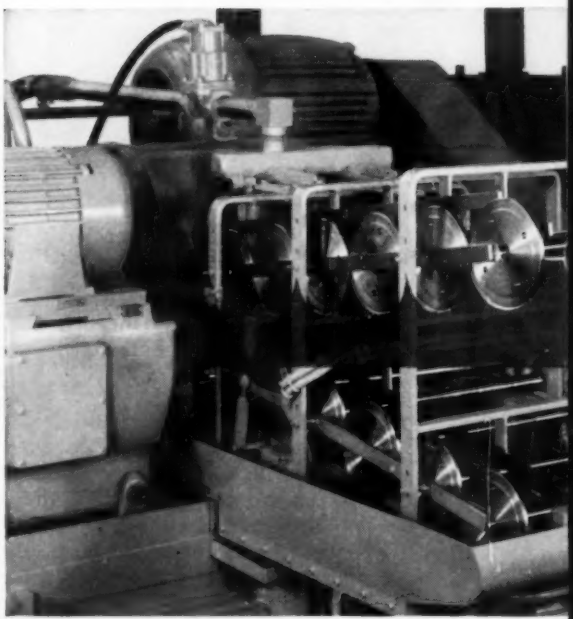
Beginning in this issue, a new paging arrangement places advertising and editorial material vis-a-vis right at the front of the magazine. Editorial departments in the vanguard include "This Month in Metalworking," "Catalogs, Manuals, and Bulletins," and "Book Reviews."

Alternating the advertising and editorial pages should produce even higher reader interest in each. One area of the publication can now more closely complement the other. This is as it should be.

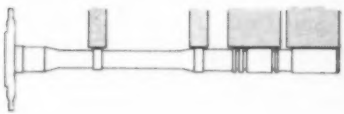


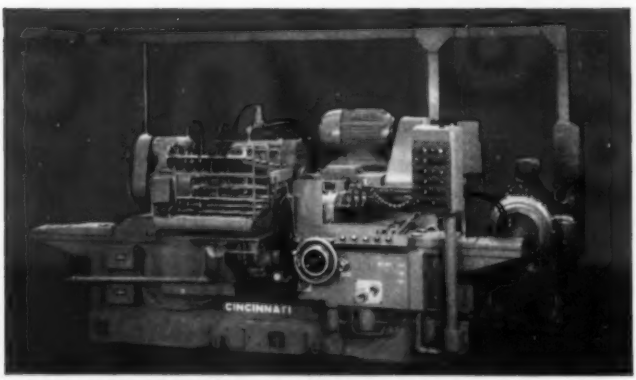
Edgar Altholz

Automatic Centertype Grinders



Widely spaced diameters are simultaneously ground on transmission output shafts in one automatic cycle, at a production rate of 92 per 48 minute hour. Cincinnati Cost-Cutting Specialists equipped a 10″x36″ Plain Hydraulic Grinder for this work. Drawing below indicates wheels and ground diameters.



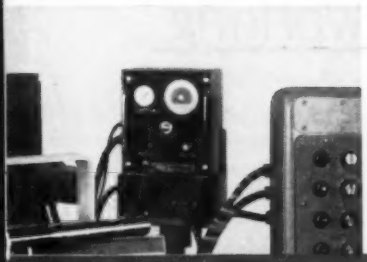


Completely equipped by Cincinnati Cost-Cutting Specialists for reliable, automatic production of output shafts shown in the drawing. The machine is a CINCINNATI FILMATIC 10″ Plain Hydraulic Grinder. Information on standard machines of this type in Catalogs G-660-3 and G-661-2.

BUILDERS OF PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CENTRIC

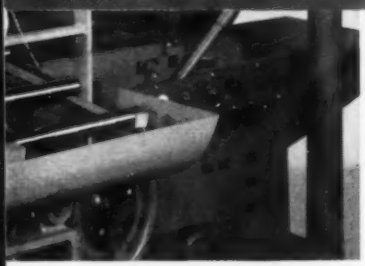
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

built by CINCINNATI | GRINDING MACHINE DIVISION



It takes considerable ingenuity to automate centertype grinding machines for continuous production duty. But it can be done quite effectively, as shown by the example illustrated here. The machine is a CINCINNATI FILMATIC 10" x 36"

keep the production line ROLLING



Multiple Wheel Plain Hydraulic Grinder, one of hundreds engineered and built for various operations by Cincinnati's Grinding Machine Division.

The machine automatically grinds several diameters on transmission output shafts, using four wheels having a 16" span. Production is at a rate of 92 per 48 minute hour.

Cincinnati cost-engineered Grinding Machines are second to none. You have the industry's widest selection of precision grinding machines; Cincinnati's ACRASIZE Gaging Systems; Cimcool cutting fluids and grinding wheels. May we help in solving your manufacturing engineering problems in the areas of precision grinding? **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

CINCINNATI

FILMATIC

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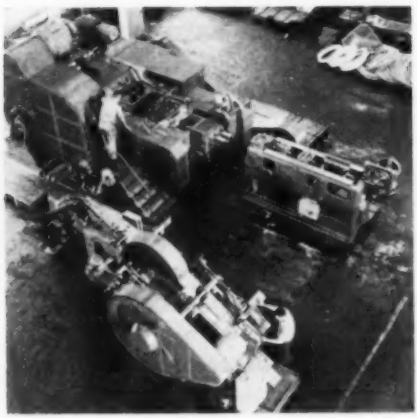
THIS MONTH in Metalworking



FINAL CHECK on a bolt maker prior to shipment.

Ten miles out of the city and in a modern plant that boosts capacity 20% with 20% less floor space, The Waterbury Farrel Foundry & Machine Co. shows new vigor.

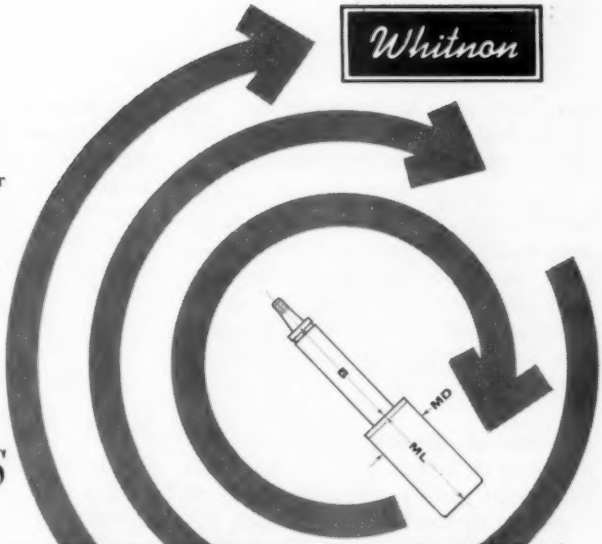
The new, one-story plant in Cheshire, Conn., replaces a century-old, multi-story building in downtown Waterbury, Conn. By eliminating the necessity for moving heavy machinery parts from one floor to another and by modernizing production flow, the new 314,000 sq. ft. factory has substantially increased efficiency.

By moving only ten miles away from its old location, the company

Whitnon

Replace your belt-driven or bronze-bearing trouble-makers with precision-built

SURFACE GRINDER SPINDLES



STYLE	SPEED	DIA.	LENGTH "B"	ML	MD	HP	VOLTAGE
D-147	3600	3	10	10½	5½	¾	220
D-161	3600	2⅝	11	10½	5½	¾	220
D-158A	3600	3	12 9/16	11½	5½	1	220/440
D-158B	3600	3¼	12 9/16	11½	5½	1	220/440
D-158C	3600	3½	12 9/16	11½	5½	1	220/440
D-158R	3600	3	12	11½	5½	1	220/440
D-199A	3600	3	12 9/16	12½	5½	1½	220/440
D-199AS	1800	3″	12 9/16	12½	5½	1	220/440
D-199B	3600	3¼	12 9/16	12½	5½	1½	220/440
D-199BS	1800	3¼	12 9/16	12½	5½	1	220/440
D-199C	3600	3½	12 9/16	12½	5½	1½	220/440
D-199CS	1800	3½	12 9/16	12½	5½	1	220/440
D-199R	3600	3″	12″	12½	5½	1½	220/440
D199RS	1800	3″	12″	12½	5½	1	220/440
D-199D	1800/3600	3″	12 9/16	12½	5½	½/1	220 or 440
D-204A	1800/3600	3	12 9/16	12½	5½	¾/1½	220 or 440
D-204B	1800/3600	3¼	12 9/16	12½	5½		
D-204C	1800/3600	3½	12 9/16	12½	5½		
D-204R	1800/3600	3	12	12½	5½		
D-213	3600	3	12 9/16	12	8	2	220/440
D-200	1800	3	12 9/16	12	8	2	220/440
D-186	3600	4⅛	14	13	8	3	220/440
D-182	1800	4⅛	16	15	8	3	220/440

THE WHITNON MANUFACTURING COMPANY • FARMINGTON, CONNECTICUT

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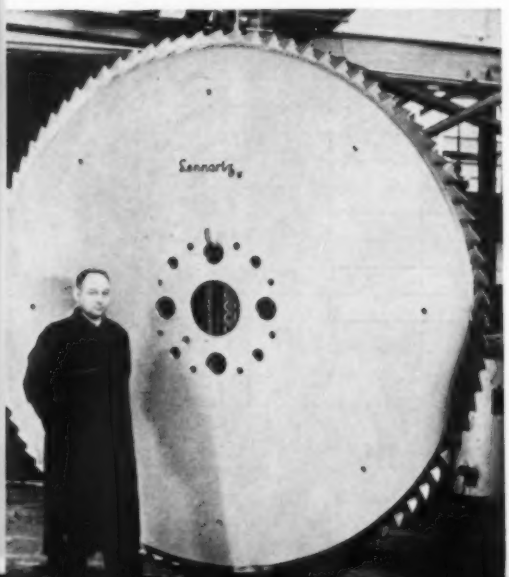
has been able to keep virtually all of its highly-skilled engineering, research, and production personnel.

A division of Textron Inc., Waterbury Farrel manufactures cold heading machines, presses, and rolling mills, including the Sendzimir mills used for precision cold rolling of stainless steel and hard alloys, and now for rolling of the new extra-thin steel tinplate.

• • •

No optical illusion, that saw has ninety teeth and is 120″ in diameter! Developed and manufactured in West Germany by the Lennartz Works, this segmented circular saw blade can handle a variety of materials—from plastics and aluminum to alloy steels. Four rivets hold the overlapping segments to the saw body. A deep tongue and groove joint form a compact connection of segment to saw body.

• • •



Americans have not let their debts grow so big that they cannot manage them. In fact, the debts that we, the people, owe as a whole seem to be sensibly in line with income. These conclusions were reached in a new 34-page report titled "Debt: Public and Private." The report was made by the Committee on Economic Policy of the U.S. Chamber of Commerce.

Of the $286 billion debt of the national government the report says: "There does not appear to be any reason why the economy cannot carry such a debt, but it does place a great premium on wise management."

Prevention of growing consumer credit—$56 billion at the end of last year—from harming the economy requires government restraint in monetary and fiscal policies during booms, the report says. A recession following a rapid build up of consumer credit could hurt. To repay debts people would stop buying.

In discussing the present level of consumer credit the report notes that repayments are keeping pace with borrowing; that credit is extended on the basis of credit worthiness; that borrowing is concentrated among young families with better than average incomes; and that since 1939 debt has grown only slightly faster than disposable personal income.

The report studies the debts of state and local governments, the debts of corporations (they owe more than does the federal government), the mortgage debt, the noncorporate private debt, and the farm debt. Numer-

TREE
RAPID-LOK
COLLET ADAPTER

1

Unlocked position • In this position tools are inserted or removed.

2

Locked position • Handle is moved upward as shown to lock tools securely. Desired locking pressure obtained by nose adjustment.

3

Working position • Tool now securely held in position—handle removed.

EXCLUSIVE TREE FEATURE

The Tree Rapid-Lok is a collet adapter designed to hold end mills, boring bars, and other tooling *accurately, securely* and *with great rapidity* on both horizontal and vertical mills, jig borers, boring bars and other machines.

It is an adaptation of an exclusive feature which has been proved in use on Tree milling machines over a period of years.

For Full Information Write

TREE TOOL & DIE WORKS

RACINE, WISCONSIN

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ous charts and tables illustrate the points made in the report.

Purpose of the report is to analyze debt in this nation's economy. Debt "is beneficial; and it also has its danger," the report says. "In our financial institutions we have developed a complex, specialized credit market through which money, debt, and credit operate as a sort of fuel system of our economy."

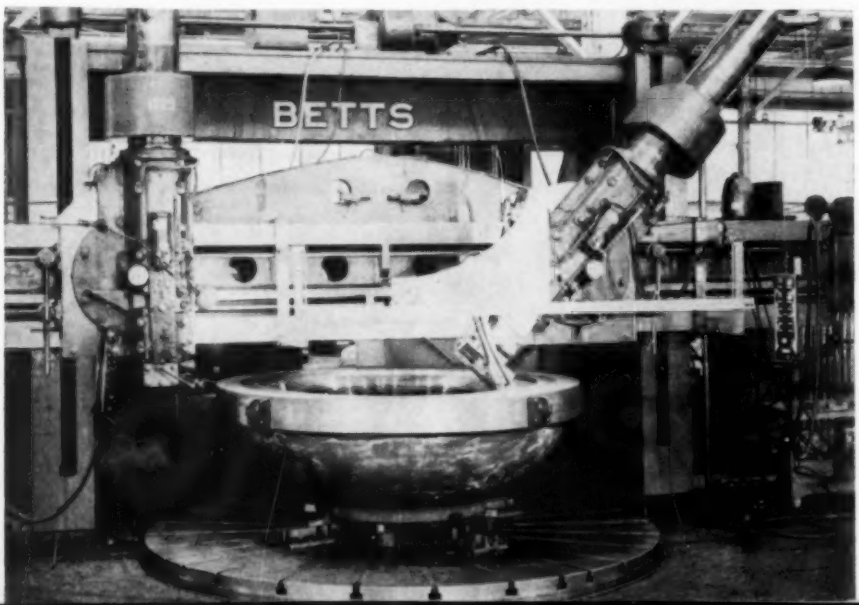
The report concludes, "In the American free market economy, flexibility and balance are necessary for debts. Reliance must be placed on monetary controls to let the markets adjust without undue debt dislocations and excesses."

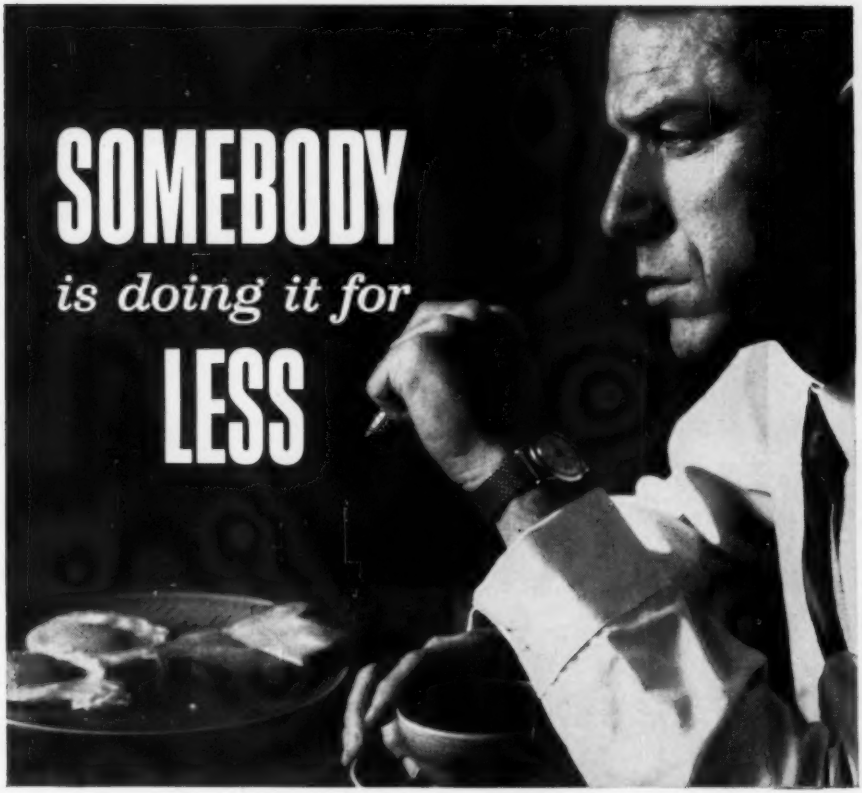
For a copy of "Debt: Public and Private," write Chamber of Commerce of the United States, 1615 H Street, N. W., Washington 6, D.C. (Single copies—$1.00. Discounts for bulk orders.) • • •

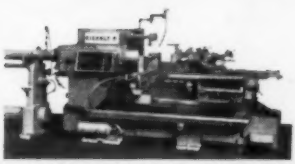
Designers like to challenge the machinist's ingenuity with some mighty difficut jobs. One of the largest dies used in the production of explosive formed parts at the Ryan Aeronautical Co.'s Aerospace Div., San Diego, is parabolic, 78″ across with a 22″ depth. Used as a missile reflector, the finished product requires a tolerance of .002″ for the X and Y coordinates.

Design studies led to the decision that the die be made of ductile iron, Type 80-60-3 pearlite. Rough calculations indicated that this tool would be machined from the largest ductile iron casting ever poured. The finished tool weighs approximately twenty tons.

Casting and machining were done by the National Suppply Co., Los Angeles. Machining was done on a Betts vertical boring mill using a Mimik hydraulic tracer attachment. The tracer is guided by a template mounted above the workpiece. • • •







GISHOLT MASTERLINE AR TURRET LATHE
Converts for bar or chucking work in less than one hour. Sets up like a turret lathe — uses same standard tools. Cycle setting learned in a day. Compare these extras: automatic withdrawal for chip clearing in deep holes; internal threading with solid taps requiring spindle reverse; external threading with self-opening die heads and automatic re-cocking; reverse feed and individually adjustable dwell to all tool stations; 16 spindle speeds and infinite feeds — none lost when threading.

Ask your Gisholt Representative for a desk-side demonstration, or write for Catalog 1224.

With recent developments in automatic machining, many manufacturers — maybe your toughest competitors — are cutting costs substantially.

Even small runs are automatic — both bar and chucking work too! All this at little more than the cost of a hand-operated turret lathe.

The Gisholt AR Turret Lathe can cut your *direct* machining costs by 25% to 40% on work now handled on manual lathes. You'll get *indirect* savings too — on tooling, inventory, setup, inspection, materials handling and floor space.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes
Factory-Rebuilt Machines with New-Machine Guarantee

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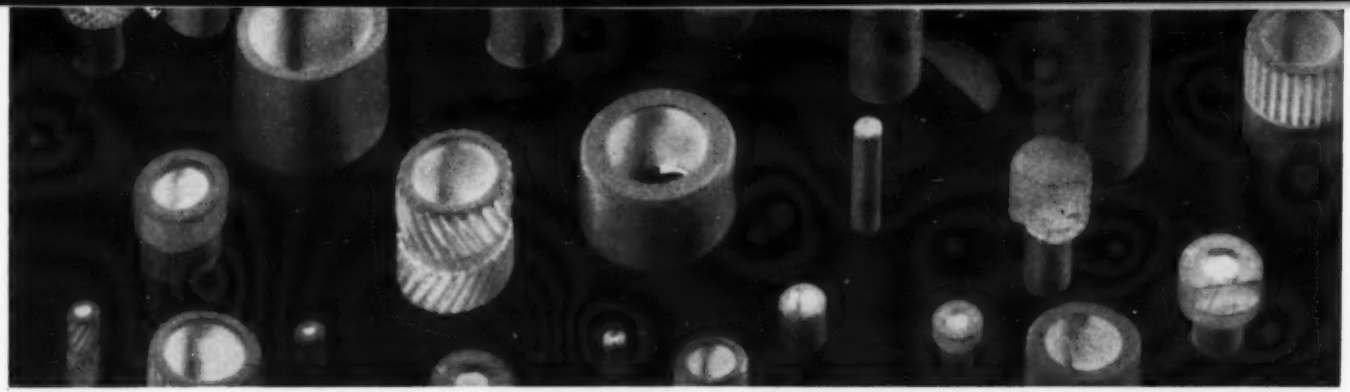
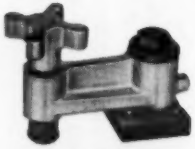
supply your needs!

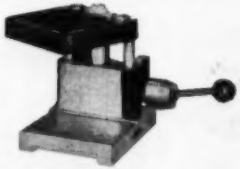


The Accurate Drill Jig Bushing Line Is A Complete Line

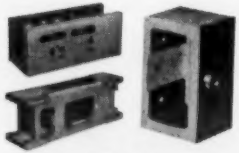
With these other ABC products, Accurate can serve as your one source for buying many important tooling items.



ABC Jig and Fixture Components



Lift Swing Drilling Fixtures



Machined Cast-Iron Sections

- **Head and Headless Press Fit Bushings**
- **Fixed and Slip Renewable Bushings**
- **Head and Headless Type Liners**
- **Knurl-Lock Bushings and Liners**
- **Press Grip Bushings and the**
- **New, ABC Thin Wall Bushings**

. . . are immediately available from stock in all standard sizes. Special bushings can be supplied quickly.

For information on ABC Drill Jig Bushings and ABC Thin Wall Bushings, write for Catalogs B-60 and TWB-61.

ACCURATE BUSHING COMPANY

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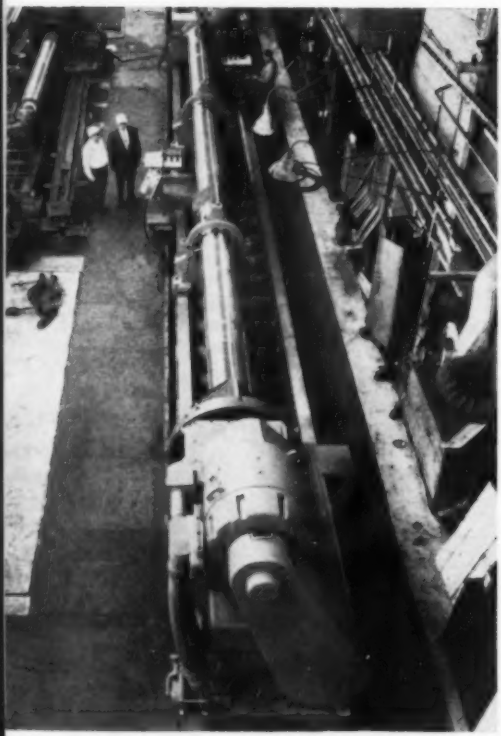


Tool life is important on long cuts such as this 45′ shaft being turned at A. Finkle & Sons Co., Chicago; it takes about 200 hours of machine time to finish this shaft, during which time over 13,000 lbs of steel will be removed from a rough forging. Finished weight of the shaft is 41,000 lbs.

The large Farrel-Betts double-head turning lathe is capable of turning a forging up to 65′ long and 7′ in diameter. The lathe is equipped with electronic controls for feeds and speeds; it does not use a lead screw. • • •

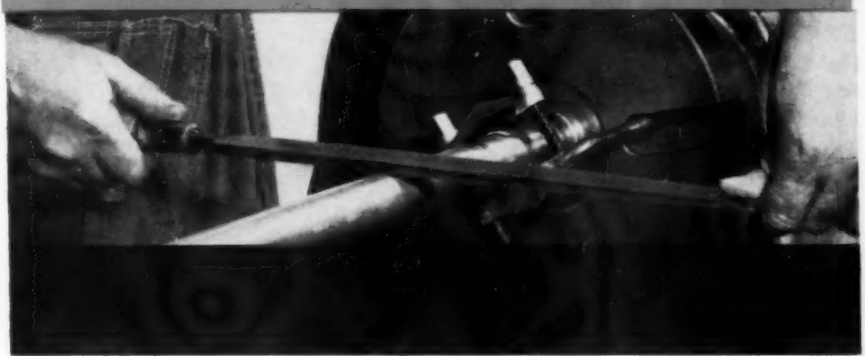
A zinc-magnesium alloy for the hot-dip galvanizing of steel is now being offered commercially by Eagle-Picher Co., Cincinnati. The alloy 97% prime western zinc, 3% magnesium is the result of wide interest created by recent news of improved corrosion resistance obtained when a small amount of magnesium is added to the galvanizing bath.

Thus far, the only method of commercially applying the new process has been to add magnesium ingot directly to the bath. The zinc-magnesium alloy is designed to simplify the process and will be used in combination with regular prime western slabs.

Studies by The Dow Chemical Co.'s Electrochemical Research Metal Cleaning Departments in Freeport, Texas, have shown that "very significant improvements in corrosion resistance are obtained when magnesium is present in amounts of 0.04 to 0.05% by weight in the galvanizing bath." Dow's six-year evaluation program indicated corrosion-resistance improvement of 20 to 90% in industrial-marine environments. • • •

The "invasion" of American industry by foreign equipment has been subject for discussion ever since the recovery of foreign manufacturers from World War II. A reversal of this has just been implemented through the placement of an order with Drever Co., Bethayres, Pa., for a continuous wide plate heat treating line to be installed at the Huttenwerk Oberhausen AG

Everything's shop shape...



Smoothing, trimming and shaping—the prime functions of a file are best done by the finest files—Nicholson or Black Diamond.

There's a file for every shape, for every material, every degree of coarseness. And every single file bearing the Nicholson or Black Diamond name is a supreme example of modern precision manufacturing—from the delicate needle file to the largest mill file.

Keep everything shop shape with a full selection of the finest files for your particular needs. Your Nicholson or Black Diamond Distributor* can suggest the file types you need.

*Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

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plant at Oberhausen in the Ruhr Valley in Germany. Huttenwerk Oberhausen is one of West Germany's leading mills producing about 6% of the country's rolled steel, as well as other ferrous products.

The installation will be the first for Drever in continental Europe. Another wide plate line is being installed at Consett in Great Britain and will go into operation this year.

The line at Oberhausen will take plate from its 160″ mill in lengths up to 50′. It consists of a charge table, a gas-fired dual temperature furnace over 200′ long, a pressure quench, and a discharge table. This line will be used for normalizing, quench hardening, and tempering quench hardened plate. • • •

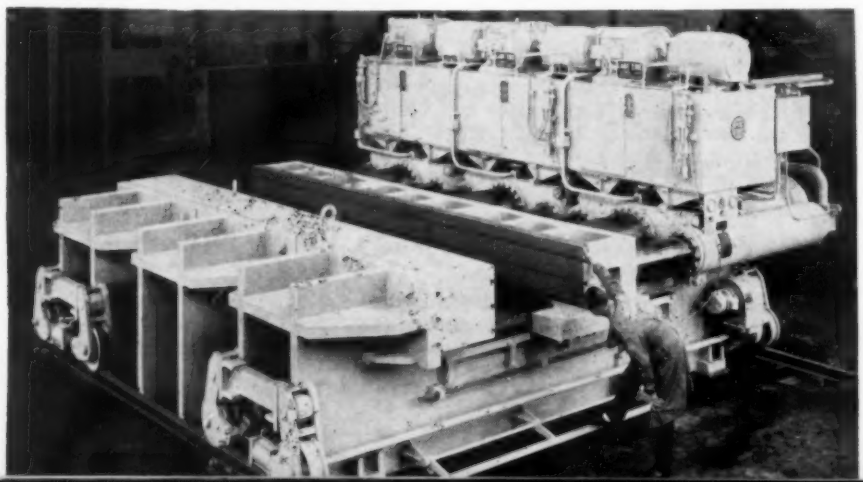
Automotive consumption of zinc die castings should rise some 17% in the 60's if present patterns continue. This increase in the use of zinc, weighted to include all makes and models, will reflect emerging trends in car ownership that promise 7 million new car sales by 1965 and 8 million by 1970.

These predictions were made and documented by E. C. Quinn, vice-

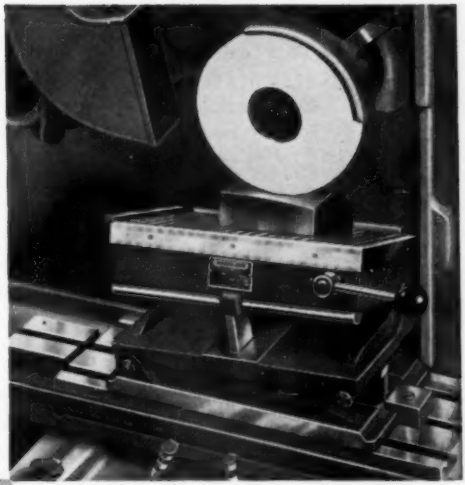
---

The largest horizontal forming press ever built has been delivered to Adams division of LeTourneau-Westinghouse, Indianapolis, Ind., by Lake Machinery Corp., Buffalo, N.Y. Weighing 400,000 lbs., this Lake Erie hydraulic press, called a "bulldozer," will be used to form frame members, mold boards and other components for earth moving equipment. The bulldozer has a total ram pressure of 2,550 tons and ram travel of 6′. The machine is composed of three 850-ton presses arranged side by side. These presses can work in unison or independently. A track allows the outside units to be moved to desired locations.

The press is 20′ wide when the three machines are working as a unit. Length is 27′ and height 12′. Each unit has a 60 hp. motor and starter, and each motor drives an oilgear 44.6 gpm pump. • • •



Angular setups in minutes with Robbins Sine Plates!



Robbins precision angular tooling cuts grinding, machining and inspection setup time from hours to minutes—eliminates V-blocks, angle plates and "trick" buildups!

Choose from 20 models—a type and size for every use.

- Work areas—4″ x 4″ for small-part inspection and light grinding; 6½″ x 6½″, 6½″ x 11½″ and 6″ x 18¼″ for bench work and production surface grinding; others up to 24″ x 24″ for heavy machining.

- Magnetic models—Robbins Magna-Sine Plates secure the work by the most powerful magnetic force ever built into a permanent-magnet chuck.

- Non-magnetic models—Robbins Sine Plates have tapped holes in the top plate. Larger models equipped with tapped holes and T-slots.

See your Robbins Representative, or write direct for prices and details.

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president, Sales division, Chrysler Corp., at the American Zinc Institute's 43rd annual meeting in Chicago.

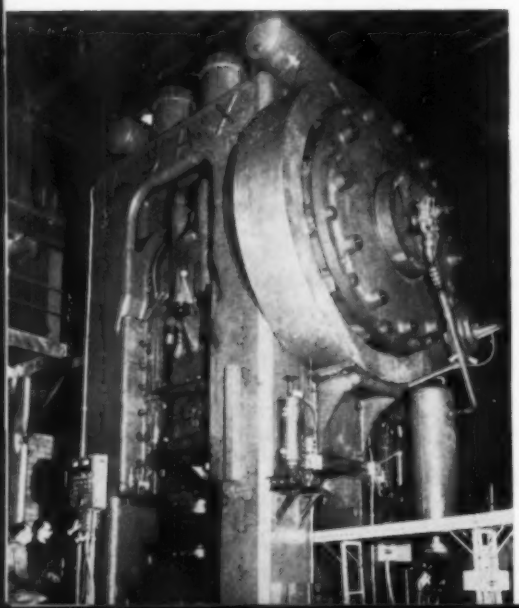
"Since 1955 the market for new cars sold at retail in the U. S. has averaged a little better than 6 million units a year," he said. "We expect this average to rise in the next few years," he continued, "and after 1965 the average year should produce close to 7 million new car sales. By 1970 the 8 million car year is a definite possibility." Quinn said.

"Where the total number of automobiles now in use is approximately 61 million," he went on, "by 1970 the number should be about 80 million, or 19 million more than at present."

Quinn concluded that foreign car imports reached a high point in 1959 when 610,000 imported cars were sold in the U. S. In 1960, the first full year for sale of new U. S.-made compacts, import sales dropped to 500,000. He predicted that, with foreign sales still dropping, 1961 import sales are expected to total about 400,000. • • •

High-speed production of many types of forgings on a new 6000-ton capacity mechanical press has just begun at the Marion division of Eaton Mfg. Co., Marion, Ohio. The new press is equal to the largest ever built and is three times as powerful as existing drop and board hammers in the plant.

Produced by Ajax Mfg. Co., Cleveland, it will be used in conjunction with a 25′ diameter rotary hearth furnace (shown) and automatic conveyors.



The press operates at 35 spm with an 18″ stroke. Forging blanks will be heated to 2200°F. in the furnace and fed continuously by automatic conveyor to the press. Die table area is 70″ across and 74″ deep with straight-through access.

It took almost a year for Ajax to fabricate this press. The huge 470,000 lbs. main frame casting cooled in the mold for 6 weeks. It is an annealed open hearth steel casting using a solid rolling mill housing type design. The frame measures 27′ high from the base, 10′ wide and 12′ deep. It was shipped from Cleveland on a special 8-axle flat-bed rail car accompanied by four "detail" cars with the remainder of the equipment.

Axle gear forgings, pinion forgings, and transmission gears will be the initial product of this gigantic press. • • •

There's a Full Tool Steel Warehouse

Behind the A-L STEELECTOR Cards!

The pocket-size STEELECTOR Cards represent a full tool steel warehouse—full of the grades and shapes and sizes.

Each STEELECTOR Card (there are cards for hot work, high speed, and tool room applications) uses bar graphs to show how the STEELECTOR grades compare in abrasion resistance, toughness, size stability, machinability, and red hardness. In a glance you can select the grade with the best combination of properties for virtually any job.

And when you select a STEELECTOR steel, you know beforehand that it is quickly available. Warehouse supplies have been increased because of the widespread usefulness of STEELECTOR grades.

A Data Stock List for each STEELECTOR grade gives you additional information—to help you make sure that the steel fits your job exactly. The steel's properties are described and the proper hardening, tempering, and annealing temperatures are given along with the steel's analysis and AISI number. A list of typical applications together with suggested working hardnesses serves as an additional check on your use of the steel.

The Data Stock List also tells exactly what sizes and shapes are in warehouse stock. You know before you order that the tool steel you choose is ready for prompt delivery.

By using STEELECTOR grades, you can save storage space in your own plant. You can reduce the number of grades you stock. And you can rely on fast off-the-shelf delivery in case your own stock runs low.

For more information on the STEELECTOR system, ask your Allegheny Ludlum representative for your copy of the colorful, 10-page STEELECTOR Booklet, or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.*** Address Dept. MB-7

STEELECTOR PROGRAM

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

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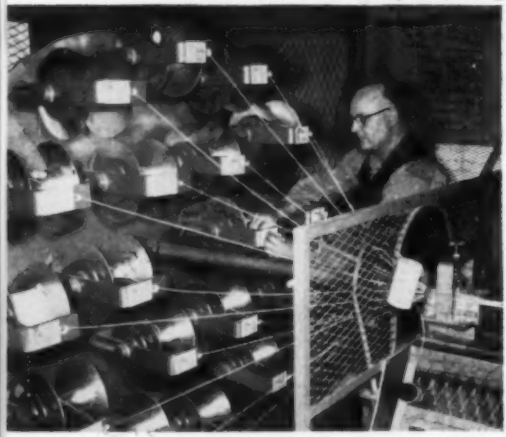
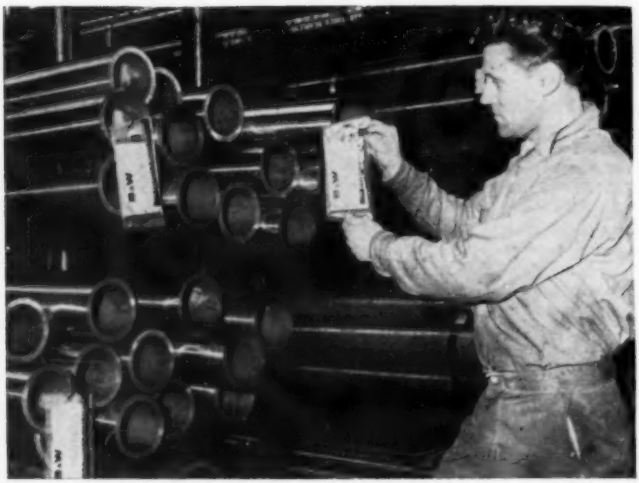


Reminiscent of the old rope-making machines for wooden clipper ships, this wire weaving spinning wheel makes cable for Lockheed's Van Nuys Missile and Space Division.

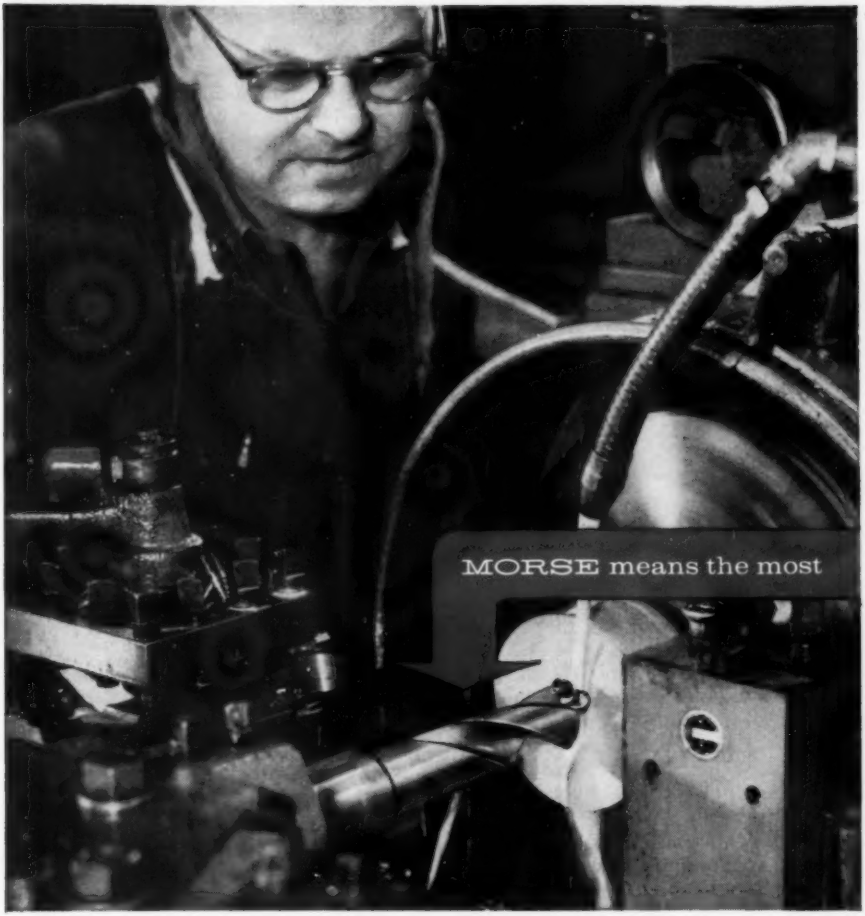
The completed multi-wire cables, each of necessity a custom-made job because of the diverse tasks performed, go to Vandenberg Air Force Base and Cape Canaveral where they are used in the electrical transmission of information between blockhouse and launch pad on the readiness of the Polaris missile or Agena satellite components from checkout to lift.

The wire stranding machine and accessories cost approximately $15,400 but savings have been estimated at ten times that figure. • • •



Don't take that shipping invoice out, Mac, all you need to know can be seen from the outside! The polyethylene envelope is Babcock & Wilcox Co., Tubular Products Div.'s new way of keeping shipping papers neat and clean even though the whole tube bundle is oil dipped for protection

with men who know cutting tools... it's MORSE everytime



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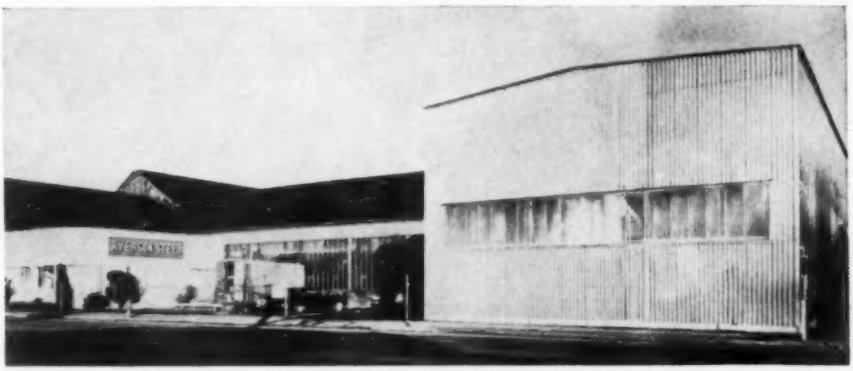
Ryerson Completes Addition

Joseph T. Ryerson & Son, Inc., has a new 13,000 sq. ft. addition at its Seattle, Wash., steel and aluminum service plant. This has permitted the company to consolidate all of its Seattle operations at 1200 4th Ave. South, address.

According to general manager **Robert T. Stafford,** the building will be used for warehousing sheet steel in atmospherically controlled surroundings, for rapidly increasing aluminum stocks, and for assembling wire into tendons for prestressed concrete applications.



C. G. Andrew President of IAA

C. G. Andrew, vice-president of production-distribution for Air Reduction Sales Co., has been appointed president of the International Acetylene Assoc. at its 63rd anniversary meeting recently held in Boston.

The IAA, one of the oldest technical societies in the country, was organized in 1898 to develop applications for calcium carbide, acetylene gas, and allied products, and to disseminate technical information concerning useful developments in these fields.

Olin Changes Trade Name

Olin Mathieson Chemical Corp., New York, has changed its trade name from Western Brass to Olin Brass. The products, customer services, and sales policies associated with Western Brass will not be affected by the change.

Michigan Professor, Pioneer Builder, Honored by ASME

Orlan W. Boston, Professor Emeritus of Mechanical and Production Engineering, University of Michigan, received a certificate of appreciation from the American Society of Mechanical Engineers. The certificate was presented during a luncheon at the annual Design Engineering conference of ASME in Detroit, May 24, by the Society's national president, William H. Byrne. Dr. Boston was honored for his work in developing standards in the field of small tools and machine tool elements.

Also honored was **Robert G. LeTourneau,** pioneer builder of giant earth moving equipment, who received the Machine Design Award. He was cited for "outstanding achievement and distinguished service in the field of machine design."

2992

HAMILTON Tapping MACHINE

SUPER SENSITIVE

Capacity — 000-120 to 10-24

In the field of small hole, precision tapping the HAMILTON Super Sensitive Tapping MACHINE stands alone. It is smooth, silent, precise, and sturdy. Spindle returns to neutral position and stops rotation instantly and automatically when pressure on the feed lever is released. To learn what this means to you,

write for our free Bulletin No. 2992.

THE HAMILTON TOOL COMPANY

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ASLE Announces Officers

Dean M. Cleaveland, Bendix Corp., South Bend, Ind., has been named president of the American Society of Lubrication Engineers. Other officers are **L. B. Sargent, Jr.,** Aluminum Co. of America, Pittsburgh, vice-president-at-large; **W. E. Hoch,** Viscosity Oil Co., Chicago, treasurer; and **A. E. Cichelli,** Bethlehem Steel Corp., Bethlehem, Pa., secretary.

Mahon Vice-President Dies

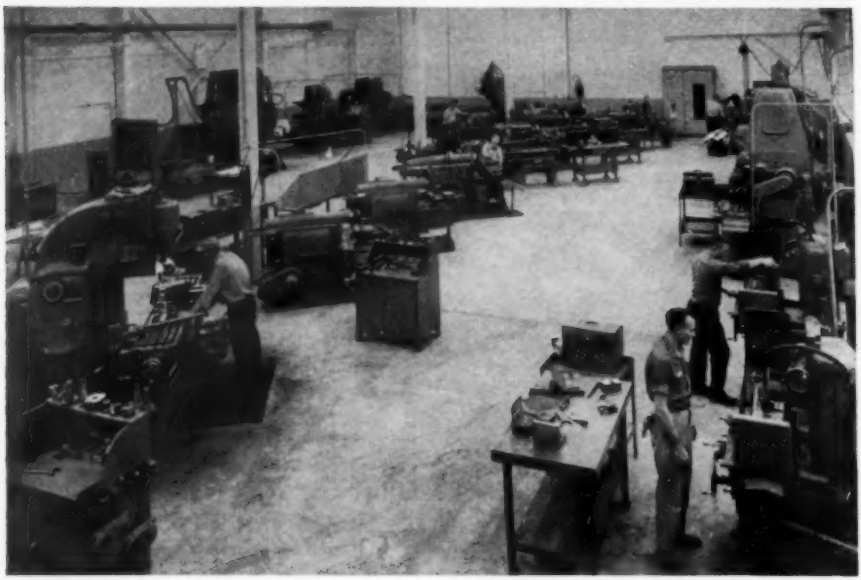
Max F. Richter, vice-president and manager of the Steel Warehouse division of The R. C. Mahon Co., Detroit, died May 18 at his home in Livonia, Mich. Prior to joining Mahon in 1933, he worked for J. T. Ryerson and Sons Co., and Whitehead and Kales.

Detroit Broach Acquires Rights On Hydraulic Control System

Detroit Broach & Machine Co., Rochester, Mich., has acquired licensing rights to a system of hydraulic control, designed to bring about cost reductions in many small and large plants engaged in machining operations. The new sales division, which has been formed because of the licensing permit, will immediately market a production tested unit that is said to convert almost any machine tool in use to a high precision tracer machine for handling either short run or high volume production.

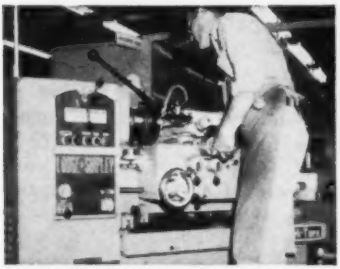
Disston Chicago Area Warehouse Moved to New Location

The Disston division of H. K. Porter Co., Inc., has recently changed its Chicago area warehouse location to 2567 Greenleaf Ave., Elk Grove, Ill.

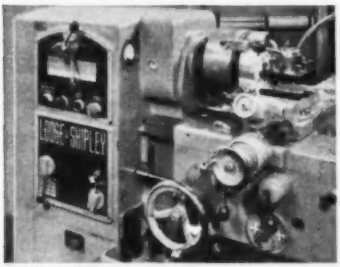


Wright Co. Has New Plant

The Fred D. Wright Co. has opened a tool and die plant at 707 Spence Lane, Nashville, Tenn. The plant contains 40,000 sq. ft. of space, and is equipped with a variety of metal working equipment (shown) including duplicating mills, boring mills, 200-ton tryout presses, and other machinery representing an investment of $750,000.



Dalmotor Div., Yuba Consolidated Industries . . . "used in model shop for turning, facing and boring all sorts of experimental parts."

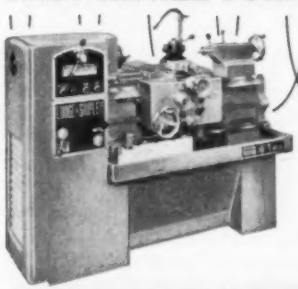


Raytheon Manufacturing Co. . . . "used for turning, facing and boring operations on brass, aluminum and steel workpieces."

Over an extremely wide range of American industry . . . for tooling, production, maintenance and experimentation . . . the Lodge & Shipley 1307 HI-TURN (10″) Lathe is making a record of true economy. With literally dozens of big lathe features, the HI-TURN is still priced substantially below many lathes having fewer features, less horsepower and lighter construction.

Turn your attention to HI-TURN. Find out why these and many other lathe users are ordering and reordering HI-TURN Production and Tracer Lathes to replace or supplement larger, far more costly lathes. For complete details, request Bulletin 331, The Lodge & Shipley Co., 3074 Colerain Ave., Cincinnati 25, Ohio.

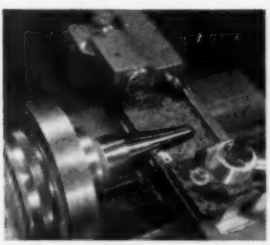
THEY'RE ALL TURNING TO Hi-Turn



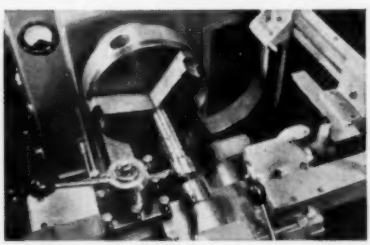
. . . your Lodge-ical choice

Lodge & Shipley

Rocketdyne Div., North American Aviation . . . "held OD turning to a tolerance of .0003″."



Leading glass manufacturer . . . "unheard of economy, ease and speed of production" on machining and reworking glass bottle tooling.



Indiana Gear Works . . . has earned a reputation of "excellent for high production."

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THIS MONTH continued

Bakken Again Elected President of CABRA

Glenn P. Bakken was reelected president of the Copper & Brass Research Assoc. at its 39th annual meeting May 15 in Hot Springs, Va. Bakken is president of Chase Brass & Copper Co., Inc.

Also reelected was **E. P. Dunlaevy**, senior vice-president. He is executive vice-president of Phelps Dodge Copper Products Corp.

Chicago Firm Changes Name

Watubo Industries is the new corporate name for Water Tube Boiler & Tank Co., Chicago, designers, and manufacturers of fluidynamics equipment.

Trico Founder Dies

Oscar H. Jung, founder and president of the Trico Fuse Mfg. Co., Milwaukee, Wis., died May 5 at the age of 76. He founded Trico in 1917 and directed its operations up to the time of his death.

Distributors

Eastern

Foote-Burt Co., Cleveland, Ohio.
(FOOTBURT machine tools)
Calco Machinery Co., Beury Bldg., 3701 N. Broad St., Philadelphia 40, Pa.

Vascoloy-Ramet Corp., Waukegan, Ill.
(cemented carbide products)
Tri-State Mine Supply Co., Uniontown, Pa.

Southern

Scully-Jones and Co., Chicago, Ill.
(holding and cutting tools)
Southern Tool Distributing Co., 54 Eleventh St. N.E., Atlanta, Ga.
(recirculating roller bearings and ball screws)
Benson Engineering Co., 4514 W. Mockingbird Lane, Dallas, Texas.

Thomas C. Wilson, Inc., Long Island City, N.Y.
(pneumatic tools, sanding and brushing machines)
F. L. Bishop Co., 333 Candler Bldg., Atlanta, Ga.

Midwest

Foote-Burt Co., Cleveland, Ohio
(FOOTBURT machine tools)
Marshall Supply and Equip. Co., 920 E. Archer St., Tulsa, Okla.

Scully-Jones and Co., Chicago, Ill.
(recirculating roller bearings and ball screws)
Special Products division of Production Service Co., 10003 Memphis Ave., Cleveland, Ohio.
Automation Components, Inc., Maplewood, Mo.

Vascoloy-Ramet Corp., Waukegan, Ill.
(cemented carbide products)
Dickman Industrial Service-Supply, Inc., Sidney, Ohio.
Herlache Industrial Supply Co., Green Bay, Wis.

Western

Scully-Jones and Co., Chicago, Ill.
(recirculating roller bearings and ball screws)
Bearing Engineering Co., 1547 Mission St., San Francisco, Calif.
Bearing Sales & Service, Inc., Seattle, Wash. and Portland, Ore.
Pacific Bearings Co., 1210 S. Hope St., Los Angeles, Calif.

Foreign

Fonda Gage Co. Inc., Stamford, Conn.
(Gage blocks and accessories)
Alexander Tools (Quebec) Ltd., Canada, and Alexander Tools, Ltd., Brantford, Ontario, Canada.

• • •

NOW... A COMPLETE LINE OF SKINNER SOFT BLANK TOP JAWS

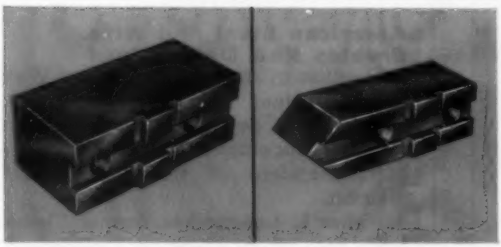
AVAILABLE FROM NEARBY DISTRIBUTOR STOCKS

...all manufactured to American Standard dimensions

- **Save time and tool costs**
- **Furnished in distinctive black**
- **Cost *less to buy* than to make yourself**

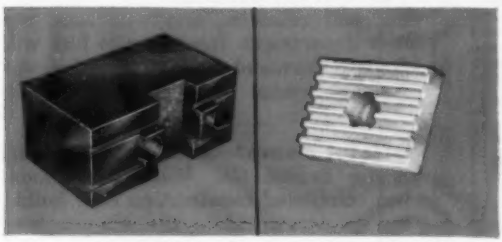
Now you can save time, money and delays by selecting from Skinner's complete line of Soft Blank Top Jaws for *all* chucks made to American Standard dimensions. Take advantage of fast, one-source service at your nearest distributor. His stocks are complete in all sizes and shapes. Call him today!

TONGUE AND GROOVE TYPE



MEDIUM DUTY—For Self-Centering Scroll Chucks, Independent Chucks and Combination Scroll Chucks.
HEAVY DUTY—For Power, Independent and Self-Centering Scroll Chucks.
These jaws can be used as supplied or shaped to meet specific requirements. Made from low carbon steel which can be easily carburized and hardened. Extra-high heavy duty top jaws are also available. The Long Pointed Jaws are designed so that points meet at center of work, permitting full use of chuck capacity.

SERRATED JAW TYPE and Master Keys



For Heavy Duty Power and Scroll Chucks
These jaws also can be used as supplied or shaped to meet specific requirements. They are processed to resist rust and can be easily shaped, carburized and hardened. Screw is supplied when jaw and corresponding key are purchased together—permitting key and jaw to be stored assembled as a matched set.

Serrated Master Keys: Precision-machined from top quality, hardened steel. Serrations are so machined that by reversing master key 180°, the top jaw can be adjusted to ½ the pitch of the serrations. This feature permits easy adjustment of the top jaws in reference to the work.

HEAT TREATING INSTRUCTIONS INCLUDED WITH ALL BLANK JAWS

Ask your distributor for folder showing complete range of sizes and shapes or write to the address below, Department 147

SKINNER CHUCKS®

THE CREST OF QUALITY

SKINNER CHUCKS

SKINNER-HORTON CHUCK DIVISION
SKINNER PRECISION INDUSTRIES, INC. • NEW BRITAIN, CONNECTICUT, U.S.A.

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Save time and money day in and day out. With a Minute Man Keyway Broach you can cut a keyway by hand, in an arbor press, **in one minute** for **as little as one cent.** Available individually or in kits complete with broaches, bushings, shims and keystock. For keyways from 1/16" to 1" in any bore ¼" to 3".

SAVINGS WITH STANDARD SQUARE BROACHES, TOO.

For finishing ⅛" to 1" square holes in one pass in cast or drilled bore. (32nd size, too)

The duMont Corp., Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST T describing Square, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name.....

Company.....

Address.....

duMont

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McKay Announces Building Plans

The McKay Machine Co. has announced plans to build a plant and general office building later this year. Construction of a combined machine shop and assembly plant, covering 145,000 sq. ft., and a three-story general office building is planned on a 34½-acre site in an industrial park on the western edge of Youngstown, Ohio.

McKay recently merged with Federal Machine and Welder Co., Warren, Ohio, which became its Federal-Warco division. It also operates a subsidiary, Berkeley-Davis, Inc., Danville, Ill.

American Steel and Wire Creates New Department

Creation in American Steel and Wire of a combined engineering, research, and product development department has been announced by **Van H. Leichliter,** president of this U. S. Steel division.

Walter L. Longnecker, former Cleveland district manager of operations, has been appointed director, engineering and research, and will head the new department. Reporting to him will be **Dr. Raymond B. Hoxeng,** who was named director of research.

Bristol Completes New Building

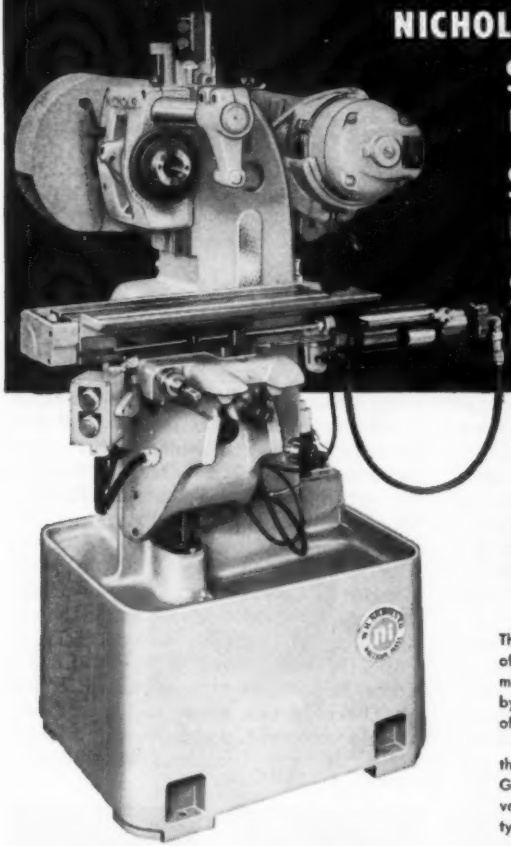
The Bristol Co., Waterbury, Conn. has completed construction of a building to accommodate the manufacture of its line of socket screws with the Nylok self-locking element. The new building is located at the main plant in Waterbury.

Hillyer Corp. Buys Plant

Hillyer Corp. has purchased a fully equipped plant at 244 Sheffield St., Mountainside, N.J. Hillyer manufactures both numerically controlled machine tools and numerical control systems for industry.

3 TIMES THE MACHINE

NICHOLS model 6-SA is:

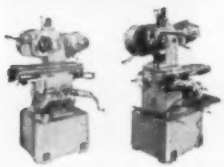


1. A high production semi-automatic miller
2. or a hand miller for short runs
3. or quickly convertible to a Precision Tool Room Miller

AT HALF THE PRICE

The Nichols model 6-SA costs less than half the price of many machines assigned to precision small parts milling. Its versatile design means continued savings by eliminating idle time. One machine does the work of 3 part-time millers. **Horizontal or Vertical!**

For *precision* small parts milling, you can't do better than Nichols, "The Millers that use Their Heads." Guaranteed accuracy to 10ths combined with the versatility of rise and fall spindle head and knee type construction.



Write for details on the complete Nichols line, "The Millers that Use Their Heads"
Sound, color, 16mm. movie "The Millers that Use Their Heads" available on free loan basis.

MANUFACTURED BY W. H. NICHOLS COMPANY

National Distributors **REM SALES INC.**
subsidiary of The Robert E. Morris Company
5001 FARMINGTON AVENUE • WEST HARTFORD 7, CONN.

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Appointments and Promotions

Personnel Changes . . . Executive and Production

W. I. Krewson, Jr.

R. B. Ayres

D. C. Page

R. Allchin

Walter I. Krewson, Jr. was appointed president of Superior Pneumatic & Mfg., Inc., Cleveland . . . **G. H. Meyner** was named president of The Frink Corp., Brooklyn, and its subsidiary, Sterling Bronze Co. . . . The Leon J. Barrett Co., Worcester, Mass., elected **Robert B. Ayres** president and treasurer, and **Dwight C. Page** executive vice-president . . . **Keith T. Middleton** was named president of The Fafnir Bearing Co., New Britain, Conn. . . . Wellman Bronze & Aluminum Corp., Cleveland, named **Richard Allchin** to the board of directors . . . **Irving Hertzberg** was appointed senior vice-president and member of the board of directors of the Judson L. Thomson Mfg. Co., Waltham, Mass. . . . Chambersburg Engineering Co., Chambersburg, Pa., named **Samuel C. Clark** to the board of directors. He succeeds **Harrie B. Price, Jr.** who has retired after 30 years as a director . . . **Asa E. Snyder** was elected vice-president of the Pratt & Whitney Co., Inc., West Hartford, Conn. . . . The Southern Pipe division of U.S. Industries, Inc., New York, appointed **Charles E. Lamar** executive vice-president . . . **L. R. Miller** was named vice-president of manufacturing at Trent Tube Co., East Troy, Wis. . . . Litho-Strip Corp., Chicago, appointed **Richard M. Thornton** vice president of research and development, and **Robert J. Kieckhefer, Jr.** vice-president of adminis-

A. E. Snyder

R. M. Thornton

R. J. Kieckhefer, Jr.

C. R. Wetterau

KALAMAZOO METAL CUTTING BAND SAW MACHINES

...there's a model to meet your needs

Kalamazoo MODEL 8C

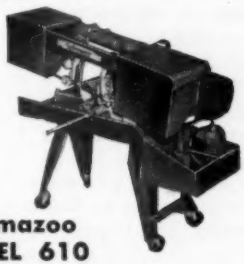
An all new design, first to meet today's metal cutting needs. Embodies years of *Kalamazoo* experience and the best industrial design talent. Cuts 8" round, 16" flat, 8" pipe. Available with or without coolant equipment.

Kalamazoo MODEL 8CW-B1

An automatic cut-off machine. $1485, complete. A low cost, completely automatic operation, job tested and approved for accuracy and efficiency, using low cost carbon blades.

Kalamazoo MODEL 1220

Where heavy-duty cutting is a problem, you'll find this rugged saw easy to use. Cuts 12" round, 20" flat. Available with or without coolant equipment.



Kalamazoo MODEL 610

Here's a low-cost saw that heating, plumbing and electrical contractors go for! Easy to move around in the shop or take along to the job. Cuts 6" round and 10" flat. Available with or without coolant equipment.

It will pay you to investigate KALAMAZOO. Ask your dealer for a demonstration or write for descriptive literature and name of your nearest dealer.

MACHINE TOOL DIV. *Kalamazoo* TANK and SILO CO.

361 HARRISON STREET • KALAMAZOO, MICH.

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D. J. Williams, Jr.

G. W. Lateste

trative matters and engineering . . . Deering Milliken, Inc., New York, announced the appointment of **Earle R. Loomer, Jr.**, as merchandise manager of its Carded Cotton division, . . . McKay Machine Co., Youngstown, Ohio, appointed **J. Roy Barefoot** executive vice-president . . . **Gabriel C. Danch** was named vice-president of the Western Design & Electronics division of U.S. Industries, Inc., New York . . . **Richard A. Hartman** was promoted to vice-president and product manager of The Palnut Co., Mountainside, N.J. . . **Dr. F. R. Hensel**, vice-president of engineering of P. R. Mallory & Co., Inc., Indianapolis, Ind., has been granted early retirement. Dr. D. G. Wilson has been named vice-president of research and engineering at Mallory . . . **Carl R. Wetterau** has joined Greer Hydraulic Inc., Los Angeles, as assistant chief engineer . . . The Udylite Corp., Detroit,

E. J. Newberg

W. Ostrom

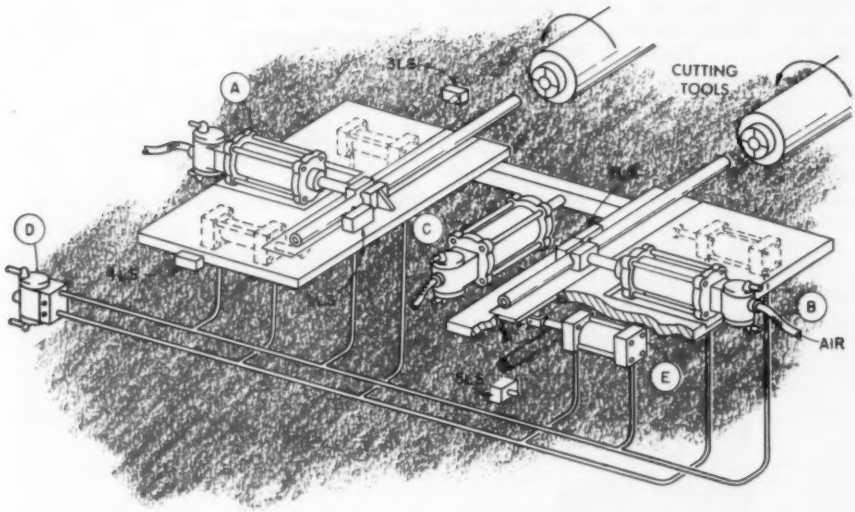
appointed **Edward E. Coolman** director of labor relations . . . **Daniel J. Williams, Jr.** was named manager of the Cleveland plant of The Producto Corp. . . . The Stanley Works, New Britain, Conn., appointed **G. W. Lateste** director of manufacturing equipment . . . **Edwin J. Newberg** was named chief industrial engineer for Warner Electric Brake & Clutch Co., Beloit, Wis. . . . **Walter Ostrom** was appointed chief designer of Volkert Stampings, Inc., Queens Village, N.Y. . . . Olsen Mfg. Co., Royal Oak, Mich., named **William F. Peschel** manager of its Induction Heating Equipment division, and **William M. Peterson**, chief engineer . . . **W. B. Moen** was appointed manager of Air Reduction Sales Co.'s Cryogenic Engineering department, Plainfield, N.J. . . . Solar Steel Corp., Union, N.J., has a

W. F. Peschel

W. M. Peterson

new manager in **James C. Petri** . . . Arrow Tool Co., Wethersfield, Conn., promoted **Armand Des Roberts** to shop superintendent and **Charles Vassilopoulos** to the estimating department . . . The Machine Tool division of Brown & Sharpe Mfg. Co., Providence, R.I., named **Earl P. Leeds** superintendent of the Milling and Grinding Machine Group, and **W. Howard Classen** in charge of Turret Drilling Application Engineering . . . **Louis E. Wengert** was named general manager of General Electric's Direct Motor and Generator department in Erie, Pa. . . . **Gilbert R. Rothschild** was appointed assistant director of metallurgical de-

THIS SIMPLE SPOT-A-MATION IDEA CAN BE USED TO END MACHINE PIPE, TUBING, ROD OR BAR STOCK



The Spot-a-mation Idea* shown above was developed by one of the automotive companies to thread torsion bars. The operator lays the parts to be machined into position and touches a start switch. Bellows Air Motors® (A) and (B) clamp the parts. Bellows Air Motor (C) advances the work pieces to the two cutting tools. When the operation is completed, Air Motor (C) retracts, the small Han-D-Air cylinders (E) automatically retracted by Electroaire Valve (D) drop the finished parts into the bins below.

This basic idea can be used for such varied operations as forming, flaring, cut-off, drilling, threading, chamfering. It can be applied to operations in wood-working, plastics, paper board, as well as metals.

The simplicity of control available with Bellows-Valvair pneumatic devices enables them to be used in a range of applications limited only by the imagination of the tool or methods engineer. Your local Bellows-Valvair Field Engineer will be happy to work with you in applying these unique devices to specific production operations in your plant. Phone him today.

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Bellows-Valvair

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DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

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* SPOT-A-MATION IDEA 0.0-12 describes this operation in detail, gives complete wiring diagram and equipment list. For this, and other SPOT-A-MATION IDEAS, write Dept. MTB-761, Bellows-Valvair, Akron 9, Ohio. No cost. No obligation.

THIS MONTH continued

velopment of Air Reduction Co., Inc., New York . . . **E. C. Bishop** was named technical coordinator and **S. Chetlin** engineering manager of Westinghouse Electric Corp.'s metals plant at Blairsville, Pa. . . . **Henry J. Killmar** was named manager of the New Products Branch of The Carborundum Co.'s Research and Development division, Niagara Falls, N.Y. He succeeds **Frederick J. Ross, Jr.**, who was appointed assistant to the general manager of the company's Bonded Abrasives division . . . **Manuel V. Nodar** was appointed product manager of stationary power tools for DeWalt, Inc., Lancaster, Pa. . . .

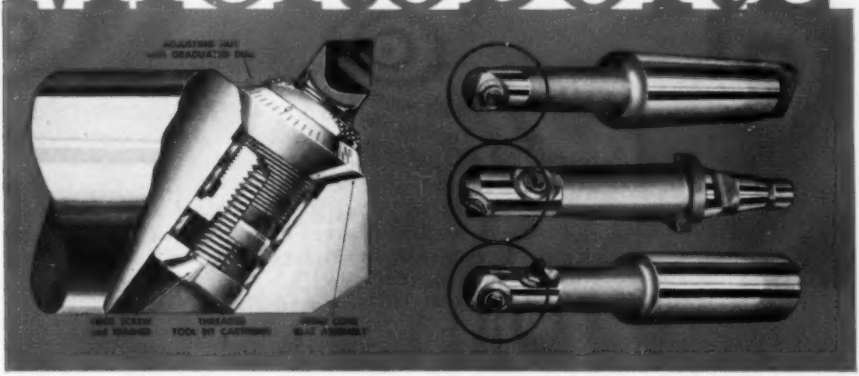
W. B. Moen

G. E.'s Instrument department, West Lynn, Mass., has a new manager in **Paul H. Wilson** . . .**Leo C. Hilt** was appointed superintendent of The Colorado Fuel and Iron Corp's seamless tube mill at Pueblo, Colo. . . . **Evan A. Edwards** was named assistant director of Eastman Kodak Co.'s film service division, Rochester, N.Y. . . . **Charles F. Wikoff** was appointed manager of the new quality control department, Norwood, Ohio, of Allis Chalmers Mfg. Co. The company also appointed **George Saar** manager of data processing and systems . . . **C. R. Stone** was named director of production for American Machine & Foundry Co., Princeton, Ind. . . . The Aluminum Co. of America appointed **Paul I. Nielsen** development manager . . .

William J. Zubrisky has been elected president and chief executive officer of Chromium Corp. of America, New York. He succeeds **Donald H. Bissell** who has been named chairman of the board . . . Chicago Pneumatic Tool Co. has elected **Guy J. Coffey** chairman of the board and chief executive officer. **Norman Readman** has succeeded Coffey as president of the company . . . Vaculator Co., Inc., Newark, N.J., has a new president in **R. E. Collins** . . . **Walter Strand** was named president and **John Simms**, vice-president, of the Merkle-Korff Gear Co., Chicago . . . **David M. Borden** was appointed chief engineer-automotive research for Chrysler Corp.'s Engineering division . . . Revere Copper & Brass Inc., New York, named **James M. Kennedy, Jr.** assistant chief engineer . . . General Electric, Schenectady, N.Y. named **R. L. Houlton** manager of process automation engineering . . . Standard Gage Co., Inc., Poughkeepsie, N.Y. elected **John E. Aldeborgh** executive vice-president . . . **Vernon Marsh** was named vice-president of the American Pulley Co., division of Van Norman Industries, Inc., Philadelphia, Pa. . . . **Bruce D. Tyler** has been appointed director of a five-day training course in nondestructive testing which will be conducted by Magnaflux Corp., Chicago . . . The Electric Autolite Co., Toledo, Ohio, has named **R. A. Olsen** general manager of its wire and cable division . . . The board of directors of The Fellows Gear Shaper Co., Springfield, Vt., has elected **William E. Millikin** treasurer and member of the board. He succeeds **Frederick P. Dashner** who recently retired . . . **H. Donald Allman** has been appointed manufacturing manager of the Federal-Warco division of the McKay Machine Co., Youngstown, Ohio . . . **William R. Donnelly** was named president of Crysler Corp.'s Amplex division. He succeeds **William P. Balthrop** who was appointed president of the Airtemp division . . . **Sherwood J. Basch** has been advanced to vice-president of engineering at Morton Mfg. Co., Muskegon Heights, Mich. . . .

the precision
cutting tool system
with built-in
micrometer vernier
adjustment

MICROBORE®



Patented micrometer vernier adjustment! That's the exclusive feature that makes DeVlieg MICROBORE cutting tools so fast and easy to set. It's the built-in feature that eliminates trial and error cuts; reduces machine downtime and rejects. Micrometer vernier adjustment is also the feature that makes it easy to achieve accuracies impossible or extremely difficult to arrive at with conventional tooling. But that's only part of the story! Write for complete information on MICROBORE. Introduce yourself to a system of multipurpose tooling designed to deliver the utmost in precision and production from today's high performance machine tools.

DEVLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY • FAIR STREET • ROYAL OAK, MICHIGAN

MICROBORE • PRECISION TOOLING CENTER

DEVLIEG MICROBORE SYSTEM

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Personnel Changes . . . Sales and Service

H. G. Brustlin

Harry G. Brustlin has been named general sales manager of Norton's Abrasive division, Worcester, Mass. He will be assisted by **John U. Calder** . . . The Electric Autolite Co., Toledo, Ohio, appointed **Earl R. Fiene** vice-president and director of sales . . . **William J. Reed** was named head of a new West Coast district office by Riverside-Alloy Metal division, H. K. Porter Co., Inc., Riverside, N.J. The new office is in Los Angeles . . . **John W. Stertzer** was named midwest regional product manager for the Denison Engineering division of American Brake Shoe Co., Columbus, Ohio . . .

C. L. Olson

Charles L. Olson was named sales-service engineer for cutting tools and conventional gages by Pratt & Whitney Co., Inc., West Hartford, Conn. . . . The Superior Die Set Corp., Milwaukee, Wis., announced the appointment of **Robert J. Patrick** as sales representative in New Jersey . . . Walmil Co., Detroit, a division of the Duraloy Co., Scottsdale, Pa., appointed **Don B. Cartwright** assistant sales manager. Two engineers were appointed to The Duraloy sales staff. They are: **Hugh McIntyre**, who will be in Detroit; and **Robert E. Kroc**, Chicago . . .

O. I. Lemmer

Orlo I. Lemmer was appointed manager-metallurgical service for Vanadium-Alloys Steel Co., Latrobe, Pa. . . . Sunbeam Equipment Corp., Meadville, Pa., appointed **A. C. Cavedo** to represent its line of industrial heat treating furnace equipment in Virginia . . . **Robert A. Lux** was appointed sales engineer in New England for the Parker-Hannifin Corp., Cleveland . . . The board of directors of National Twist Drill and Tool Co., Rochester, Minn., named **William I. McClelland** general sales manager of its Winter Bros. Co. division . . .

H. F. Wright

The Champion Steel Co., Willowick, Ohio, appointed **Howard F. Wright** as its representative in the Detroit area . . . Armco division of Armco Steel Corp., Middletown, Ohio, promoted six in its sales organization. They were: **George H. McClure**, assistant manager of sales administration; **Dwight L. Hagedorn**, assistant manager of central sales; **Frank R. Ditmars**, assistant manager of western sales; **Bert F. Carothers, Jr.**, assistant manager of eastern sales; **Edwin L. Singley**, assistant manager of stainless steel products; and **James B. Rafter** district manager in Philadelphia . . .

BRING DOWN COSTS

with this TIME SAVING 4-in-1 OPERATION

Simultaneous

BURRING • CLEANING • FINISHING • POLISHING

TIME SAVINGS UP TO 50%

The new concept in abrasive applications, replacing older, costlier finishing methods

The exceptional abrasive-and-rubber working action of multi-use Brightboy will shed a revealing light for you on substantial cost savings. Bridges the gap between the grind and buff in ONE OPERATION. The finish frequently constitutes the final polish. Replaces various older methods for working:

ALL METALS • WOOD • GLASS • FIBERGLASS • LAMINATED MATERIALS • SOME PLASTICS

Immediate delivery JOB-MATCHED STOCK TEXTURES SPECIFICALLY SUITED TO YOUR REQUIREMENTS

Wheels, sticks, rods, blocks and points in wide range of Silicon Carbide and Aluminum Oxide textures—extra fine to extra coarse—in soft, semi-firm, firm and tough rubber binders—for machine and manual operations. The only complete, comprehensive line of soft rubber bonded abrasives.

Brightboy is breaking cost barriers now for countless users.

TELL US WHERE YOU WANT TO SAVE. WE PROBABLY CAN ADVISE YOU HOW.

Write for the cost-saving Brightboy Catalog-Manual covering:

- Methods and Applications
- Machine Speeds
- Job-Matched Stock Numbers
- Wheel Sizes—Complete Range

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street Newark 7, N.J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

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F. J. Hurst

Francis J. Hurst has been appointed assistant sales-manager of carbide and distributor products at Pratt & Whitney, West Hartford, Conn. . . . **Stephen Sanders** was named vice-president in charge of sales by the Rolled Steel Corp., Skokie, Ill. . . . **W. R. King** was appointed manager of metalworking machinery industries sales for the General Electric Co., Schenectady, N.Y. . . . The A. F. Holden Co., Detroit, announced the appointment of **Theodore B. Wilk** as sales manager . . . **Fred W. Beitner** was named vice-president, sales for Trent Tube Co., East Troy, Wis. . . .

H. K. Porter Co., Inc., Pittsburgh, Pa., named **Robert O. Phillips** general sales manager of its Disston division. Products sales manager for the same division is **Robert W. Brady** . . . **S. R. Cudnohufsky** will head the new tracer control sales division of the Detroit Broach & Machine Co., Rochester, Mich. Assisting him will be **J. Cudnohufsky.** A new broach sales division for the same company will be managed by **R. L. Kamischke** . . . **John R. Sharp** has been named western regional manager for the Denison Engineering division of American Brake Shoe Co., Columbus, Ohio . . .

R. O. Phillips

L. G. Enroth

Famco Machine Co., Kenosha, Wis., appointed **L. G. Enroth** general sales manager. He will be assisted by **C. George Mattusch** . . . **Walter T. McCoy, Jr.,** has been named manager of the regional sales-engineering office in Chicago for The R. C. Mahon Co., Detroit . . . **Joseph T.** Ryerson & Son, Inc., appointed **Frank R. Tichy** manager of work order sales at the company's Houston, Texas, plant . . . Brown & Sharpe Mfg. Co., Providence, R.I., named **James F. Rowley** sales director of turret drilling machines and **Arnold N. Hellewell** sales director of screw machines . . .

The Brush Instrument division of Clevite Corp., Cleveland, appointed **John Carge** manager of the midwest district office . . . **W. J. Kocher, Jr.** has been appointed assistant manager of engineering services for Air Reduction Sales Co.'s Minneapolis district . . . **Edgar W. Blake** and **Marshall C. Earley** have been named to the sales department of The Cushman Chuck Co., Hartford, Conn. . . . **Fred Lopardo** has joined Leland-Gifford Co., Worcester, Mass., as sales engineer in the Brooklyn-Long Island area . . . Westinghouse Electric's Blairsville, Pa. plant have a new marketing manager in **E. V. Clarke** and a new manager of staff services and management in **R. C. Humphrey** . . .

John Carge

Precision Ground Atrax SOLID CARBIDE TOOLS AND BURS

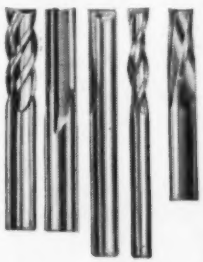
Job Applications

THERE IS AN ATRAX SOLID CARBIDE END MILL ENGINEERED FOR SUPERIOR CUTTING PERFORMANCE ON ANY MATERIAL!

The most widely used Atrax End Mills and the materials on which they are engineered to perform best are shown in this table:

RECOMMENDED APPLICATIONS

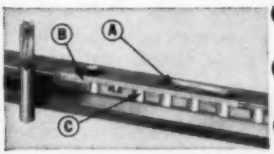
ATRAX "STANDARD" SOLID CARBIDE END MILLS



Material	Series 1501	Series 1502	Series 1503	Series 1504	Series 1505
Carbon Steels					X
Free Cutting Steels					X
Nickel					X
Nickel Chrome					X
Stainless Steels					X
Cast Iron		X	X		
Malleable Iron		X	X		X
Brass and Bronze	X				
Aluminum	X			X	
Zinc Alloy	X				
Copper	X				
Hard Rubber	X				
Fibre	X				
Plastics	X				
Monel Metal					X
Toughened & Heat Treated Steel					X
Hardened Steels					X
Titanium					X
Magnesium	X			X	

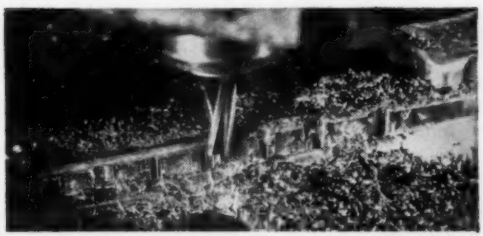
X—Preferences

TYPICAL SERIES 1505 PERFORMANCE ON ROCKWELL C-64 HARDENED TOOL STEEL WORKPIECE



A Elongating 3/8" slot, 1/16" deep at 700 rpm.
B Step cutting 3/16" wide—3/32" deep at 1150 rpm.
C Counter boring at 1150 rpm.

Note high surface finish and absence of burs and scoring. This Atrax 3/8" 1505 End Mill showed no appreciable wear land after completing three operations on this hard-to-cut material.



Note efficient, uniform chips with no burning and no chatter.

AN END MILL FOR EVERY APPLICATION

There is an Atrax "Standard" Solid Carbide End Mill job engineered for virtually every End Milling application. The Atrax Catalog gives engineering data on speeds, feeds, use of coolants and job hints that will further increase tool life and speed production when you specify and use these superior Atrax Tools.

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1. Marking Devices. More than 200 marking tools, fixtures, and automated stamping machines for all marking operations are detailed in this 48-page catalog. Standard stamping holders, as well as press-type holders, are also given. M. E. Cunningham Co., 1025 Chateau St., Pittsburgh 33, Pa.

See Number 1

2. Temperature Recording from Platinum Resistance Sensors. This 12-page booklet describes how a Brush universal carrier amplifier and a platinum resistance sensor are applied to provide a combination for recording temperatures from —320° to 2000°F. Basic setup procedures, temperature compensation, bridge circuits, calibration charts, and recording accuracy are also described. Brush Instruments, a division of Clevite Corp., 37th & Perkins, Cleveland 14, Ohio.

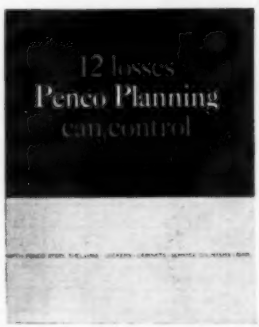
See Number 2

3. Controlling Storage Losses. This 16-page booklet pinpoints 12 common storage losses and how they can be controlled with Penco equipment. The booklet is intended to help storage system planners arrive at their objectives quickly and efficiently. Penco Division, Alan Wood Steel Co., 200 Brower Ave., Oaks, Pa.

4. Open Side Milling Machine. This 21-page bulletin No. 77 discusses the Gray handymill which is offered in 30", 36" and 42" sizes. Features include non-metallic vee table ways and a helicone transmission. This machine is said to be ideal for both production work and general everyday shop jobs. The G. A. Gray Co., 3611 Woodburn Ave., Cincinnati 7, Ohio.

5. Pressure Blasting with Manufactured Abrasives. A special report by the Norton Co. describing the areas of application for pressure blasting and various media used. Emphasis is placed on the proper selection and use of aluminum oxide and silicone carbide abrasive. Norton Co., Worcester 6, Mass.

6. "More Holes Per Dollar." A 4-page bulletin on the cost-cutting features of punches and dies manufactured by The Cleveland Punch & Shear Works.



See Number 3

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The proper knives, engineered for the job, can improve your metal cutting operation. A WAPAK engineering survey of your operations will produce positive recommendations to improve both knife life and the quality of cutting.

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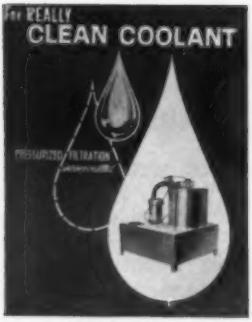

See Number 8

See Number 9

See Number 10

Twenty-one standard punches and dies in 400 sizes are presented, as well as eccentric and bevel-top dies, ripping punches, and straight shank punches. The Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland 14, Ohio.

7. Tooling for W&S. A 6-page folder on a throwaway insert designed by Valenite Metals for Warner & Swasey chuckers, bar automatics, and turret lathes. This new line includes six different holder styles utilizing square, diamond, and triangular shaped indexable inserts. Valenite Metals, a division of Valeron Corp., Box 205, Royal Oak, Michigan.

8. Filtration Equipment. Bulletin 100 on a filtration system developed to remove contaminants from machine tool coolants. This unit is especially effective in handling highly abrasive material over 5 microns at a rate of 30 gal. per min. Pressurized Filtration Inc., 6910 Chase Rd., Dearborn, Mich.

9. 125-Ton OBI Press. Catalog sheet on the largest Havir Press-Rite ever built which features a large die area and an extended shut height. This 125-ton OBI has normalized weldment with specifically designed reinforcements. Havir Mfg. Co., 44 North Cleveland Ave., St. Paul, Minn.

10. Air-Flo Fixture. Bulletin describing a fixture for sharpening end mills and milling cutters which has a spindle that actually floats on a cushion of air. Also included are details of various setups and accessories, performance charts and applications, Harig Mfg. Corp., 5751 W. Howard St., Chicago 48, Illinois.

11. General Catalog 700 from Armstrong Bros. describes its complete line of tool holders, setup and holddown tools, tool bits, machine shop specialties, wrenches, wrench sets, miscellaneous hand tools, and pipe tools. Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago 46, Ill.

12. Face Milling Cutter. A brochure on a new unusual face milling cutter that is said to be rigid, yet fully adjustable. Sweeps a 3½" through 7" face with ease. Industrial Sales Service, Inc., 6626 Maple, Dallas 35, Texas.

13. Universal Plugs for Comparators. Bulletin 8009 on the Moore universal plug system which discards the one-picce design in favor of three-piece construction. This affords the use of three different adapters with any standard sized universal plug. Moore Products Co., H & Lycomings Sts., Philadelphia 24, Pa.

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MARKING TOOL

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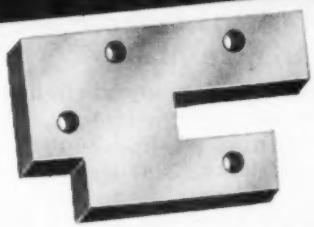

213B

Vertical Milling...Profiling...Slotting ...Drilling: With Engravograph, this shape was profiled and the holes were spotted and drilled in one set-up, from one master template, eliminating expensive tooling, multiple operations on costly equipment.

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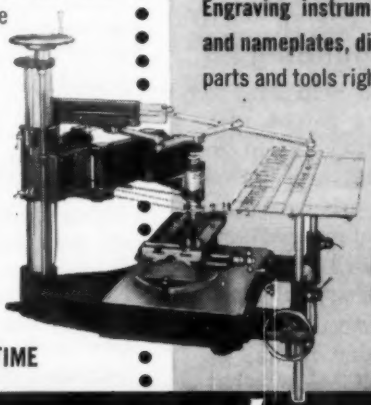
Engraving instrument panels, legend and nameplates, dials, and marking all parts and tools right in your own shop.



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JOB SHOPS
make good money with metallizing because they save good money for local firms.

METCO has prepared a special bulletin detailing actual operations and costs of typical flame spraying work on shafts, templates, bearings, many other surfaces. Use coupon to get your free copy.

NEW! Business-building kit for job shops, to help METCO equipment owners build new business, pay off investment in minimum time, and use flame spraying to increase other machining and welding business. Contains samples of direct mail letters, post cards, envelope stuffers, photos, advertising mats. These promotion materials are available in lots of 100 at our cost, well below what you'd have to pay to print your own. One copy of kit available free —send for it today. (See coupon.)

These real-life examples show how plants save money, job shops make money with metallizing

Necks of winding rolls in a textile mill were formerly repaired by a slow machining method, requiring highly skilled labor. Now the worn necks are built up with flame sprayed metal, quickly machined to size. Savings run $20,000 a year.

A job shop in California specializes in flame spraying oil well pump plungers, gets all the business it can handle in spite of the fact that the plungers it hard-faces last eight times as long as new ones. The largest ones cost only $45.00 to rebuild, against $110 to replace. Volume on just this one profitable metallizing service: $35,000 a year.

Valve plugs and seats, working in sand, oil and salt water, lasted only a few hours in service. Hard-faced by welding, a set cost $155, lasted from 3 to 8 hours. When flame sprayed with tungsten carbide powder, service life was increased to a minimum of 2 weeks, 4100% longer! Cost of metallized set, $73. But reduced downtime far outweighs the dollar savings.

A Connecticut job shop makes a very good profit when it flame sprays small

Any good mechanic can quickly master the three basic steps of metallizing: 1. prepare the surface; 2. flame spray; 3. finish.

shafts for $27.50. The customer is happy, too—he formerly had to pay over $50 to have shafts built up with welding.

The same job shop salvaged a big degreasing tank, value $2,850, by flame spraying with zinc for $683. The shop made money, the customer saved money.

A shipbuilding company installed metallizing equipment to repair such parts as pump rods, pistons, crank shafts for diesel engines, stern bushings, valve stems. A badly worn tugboat shaft, replacement cost $3,000, was repaired and made better than new for $400. That job alone more than paid for the METCO equipment.

From these cases you can see how modern metallizing pays, whether in plant maintenance departments or in job shops serving the many companies that don't need their own installation. Wherever there's wear, in rotary or sliding action, there's an opportunity to save money and make money.

New and improved materials

Among these new materials are a number of nickel, chrome, boron hard facing powders. Sprayed tungsten carbides are also widely used. Many others are available to give new values to the basic benefits of metallizing, which may be summarized as: less downtime; far less machining or grinding time, reduced parts inventory; and "better than new" performance of the metallized parts.

With savings like these there is plenty of leeway for good job shop profits *and* big savings for manufacturing plants. To learn more about these opportunities, check the coupon and send it off today.

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How to SAVE MONEY and cut downtime with Metallizing

- ☐ Send copy of Bulletin 15, "How to Save Money and Cut Downtime with Metallizing"
- ☐ Have Field Engineer Call

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Company _____

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14. Dies and Molds. A 16-page brochure on dies and molds made from Meehanite metal. Why and where they can be used are given, along with the properties of Meehanite's different types. Meehanite Metal Corp., 714 North Ave., New Rochelle, N.Y.

15. Heat Processing Furnaces. A 4-page bulletin GER-1751 explains how to prepare an economic study on heat processing furnaces. Included are sections on where to obtain data, how to make the study, and what items to consider. Three typical examples are given. General Electric Co., Schenectady 5, N.Y.

16. Torque Motors. Bulletin 208A explains Ohio Electric's torque motor that can be used as either a motor or a solenoid. It is rated by torques, and duty specification is based on the time the motor may safely be stalled across the line. The Ohio Electric Mfg. Co., Maple Heights, Ohio.

17. Die-Forming Material. This brochure describes a new die-forming material known as Elastacast. It is a polyurethane material that eliminates draw marks, thus cutting costs by simplifying the preparation of the punch or die and by reducing or eliminating polishing operations. Standard Die Set Co., Providence, R.I.

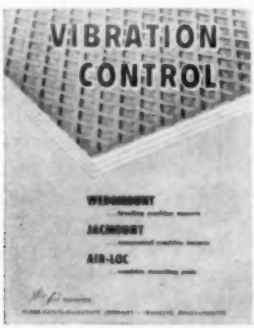
18. Machine Mounts. A 4-page catalog on the Clark-Cutler-McDermott machinery mounts for vibration control. A section is devoted to the results of tests conducted to show the physical properties of the mounting material. Clark-Cutler-McDermott Co., Franklin, Massachusetts.

19. Temperature Control Equipment. A 240-page catalog on the Blue M Electric Co.'s lines of electric ovens, furnaces, baths, environmental cabinets, related temperature control equipment, and accessories for the laboratory, pilot plant, and production. Included is a 16-page comprehensive technical section designed to supplement catalog descriptions. Blue M Electric Co., 138th & Chatham St., Blue Island, Ill.

20. Adjustable Bushings. A 32-page pamphlet designed to quickly describe adjustable wall-thickness bushings and the associated Adjusto-Fit products. Typical usages are given. Adjustable Bushing Co., 12036 Vose St., North Hollywood, Calif.

21. Optical Wheel Forming Attachment. An attachment to dress grinding wheels optically is described in this 6-page brochure. This device, which mounts permanently to most standard surface

See Number 16



See Number 18

new Di-Acro turret punch press*

Accurate Burr-Free Punching at 12 Rotating Stations

Dial a hole in a jiffy. Micrometer front operated back and side gauges provide instant gauging.

The new Di-Acro 4 Ton Turret Punch Press provides rapid, close tolerance punching of round, square, oval and rectangular holes from 1/16″ to 2″.

Rotating turrets provide rapid indexing for single or sequence punching. Precision hole location quickly obtained with Micro-twin gauges. Punches sheet metals up to 16 gauge mild steel, fibreboard, asbestos, paper, cork, leather, rubber, plastic and other sheet materials.

Dies are mounted in turrets—always handy. Standard clearance between punch and die is .002″. Choice of 6 other clearances at no charge. The Di-Acro Turret Punch Press is safe, simple to operate—requires little maintenance.

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or tool and cutter grinding machines, uses a 10x microscope to acquire a blend between radii and angles in forming the wheel. Optical Division, The Parker-Hartford Corp., 650 Franklin Ave., Hartford, Conn.

22. Cut-Off Wheels. A 6-page bulletin describes the Dayton safety cut-off wheel which is available for both wet and dry cutting operations. Included are suggested specifications for specific applications as well as several hints on proper operation. Simonds-Worden-White Co., 1101 Negley Place, Dayton 7, Ohio.

23. Marking and Numbering Machines. A ready-referenced catalog indexing marking machines and giving thumbnail sketches of each. The equipment illustrated ranges from manual through fully-automated, for all marking applications. A companion booklet is also available. The Acromark Co., 9-13 Morrell St., Elizabeth 4, N.J.

24. Chemicals for Ultrasonic Cleaning. A 14-page booklet from Branson Instruments, Inc. on the physical properties of most commonly used cleaning chemicals, as well as suggested applications, working temperatures, and procedures. With this booklet, users of ultrasonic equipment should be able to select the chemical best suited for a specific cleaning problem. Branson Instruments, Inc., 40 Brown House Road, Stamford, Conn.

25. Pedestal Grinder. A bulletin on the Delta 7" grinder which features "Twin Lite" safety shields containing double-strength, shatterproof glass. The bulletin lists specifications for the grinder and electrical characteristics for the various motors available with it. Delta Power Tool Division, Rockwell Mfg. Co., 488 N. Lexington Ave., Pittsburgh 8, Pennsylvania.

See Number 26

26. Tubing Buyers Guide. Characteristics, size range, and relative costs of carbon and alloy-steel tubing for mechanical, structural, and hydraulic applications are presented in technical bulletin 12-10. Tips on when to use tubing instead of bar stock for parts production are also given. Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.

27. Small Heavy-Duty Lathes. A bulletin from R. K. LeBlond Machine Tool Co. describes its NE design small (20 hp) heavy-duty lathes. They provide from 17½" to 25" swing over the beds. This model, in four sizes, offers 27 different spindle speeds and 60 thread changes. R. K. LeBlond Machine Tool Co., Madison at Edwards Road, Cincinnati 8, Ohio.

28. Vertical Lathe. A catalog on the Bullard multi-automatic lathe which features widely variable and independent spindle speeds at each work station. This model is available with six or eight spindles at speeds from 45 to 450 rpm, and twelve spindles from 83-750 rpm. The Bullard Co., Bridgeport 9, Conn.

29. Di-Profiler Accessories. Booklets are available which feature the techniques

Transform your stubborn mule to a prime mover

PROVED... TURRET LATHE AUTOMATION

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Hydrive transforms older turret lathes from limiting factors to high volume producers! Technical management is being stimulated to machine tool re-evaluation in view of the proved success of automating turret lathes with Hydrive. Stepping up manual turret lathes to automatic operation—easily capable of tripling output—will multiply your capacity at surprisingly low cost. Without the substantial expenditure of new equipment, management reaches increased production goals . . . with wanted accuracy and reliability.

Write today for complete Hydrive information . . . how Hydrive will make your turret lathe far more productive. Also available upon request, FREE Hydrive film.

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See Number 28

and accessories for the Di-Profiler reciprocating hand machine which has a variable speed of 0 to 100 strokes per sec. This unit was designed for filing, lapping, honing, polishing, scraping, and sawing. Hyprez Division, Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

30. Direct-Reading Optical Measuring Instrument. A brochure on Vernac, a direct-reading optical measuring instrument which can be read directly to .0001" without interpolation when it is mounted on a machine tool. Simpson Optical Mfg. Co., 3200 W. Carroll Ave., Chicago 24, Ill.

31. Mist Coolant System. A bulletin describing the type C Trico-Mist coolant system which is intended to provide cooler, faster, and cleaner work on metal cutting tool and stamping operations. This unit sprays the mist from compressed air under 50 to 125 lbs. of pressure from a shop line. Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wisconsin.

32. Fatigue Testing Machines. A 12-page bulletin describing the Riehle-Los hydraulically-actuated fatigue testing machines which are capable of testing material specimens and complete structural components. These machines can also be used for conventional static testing. Riehle Testing Machines Division, American Machine and Metals, Inc., East Moline, Ill.

33.Aluminum Tooling Plate. Aluminum Co. of America has a pamphlet listing its complete line of tooling plate which is designed to meet all machining specifications. A reference compares tolerances, properties, and other data of the three types—nonheat-treated wrought, heat-treated wrought, and cast. Aluminum Co. of America, 792 Alcoa Bldg., Pittsburgh 19, Pa.

34. Production and Toolroom Milling Machines. A bulletin showing the latest milling machines manufactured by Hydro-Mill Corp. and featuring the company's horizontal models, as well as its air, hydraulic, or hand milling machine. Hydro-Mill Corp., Crystal Lake Road, McHenry, Ill.

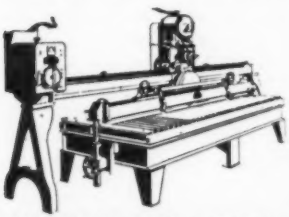
35. Metalworking Equipment. A publication, entitled "Yoder Product News," gives a complete rundown on the Yoder Co. product lines of metalwork-

" . . . then I was replaced by a machine that only cost $32.16!"

Friction Saw Cuts Structurals–Rails & Pipe . .

FAST!

SAWS FOR SHORT CUTS



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One Piece Construction Proved Coolant System

These revolutionary, friction saws are one-piece construction . . . need no expensive pits . . . can be moved quickly and cheaply. Coolant system keeps cut hot, blade cool . . . electronic pressure feed eliminates complicated hydraulic system . . . varies pressure as blade moves through different thicknesses. Steel safety shroud reduces noise level . . . stops flying sparks.

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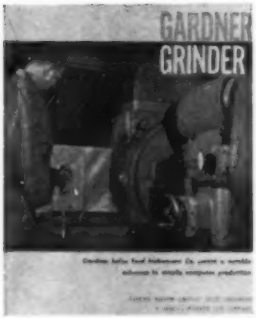


See Number 36

ing equipment, as well as pipe and tube mills. Complete specifications are listed. The Yoder Co., 5500 Walworth Ave., Cleveland 2, Ohio.

36. Rotary Disc Grinder. A case study telling how the Gardner 2H30 grinder and Gardner abrasive discs helped Ford Instrument Co. in missile computer production. Gardner Machine Co., Beloit, Wis.

37. Stationary Die Heads and Throwaway Insert Chasers. A bulletin detailing H&G stationary die heads and particularly a new 5-chaser model. Throwaway insert chasers are explained and numerous economic uses are given. The Eastern Machine Screw Corp., New Haven 6, Conn.

38. High-Speed Drill Presses. A 4-page bulletin on high-speed drill presses which can be used for printed circuit work, instrument and jewelry manufacturing, as well as secondary screw machine operations. The Electro Mechano Co., 241 E. Erie St., Milwaukee, Wisconsin.

39. "Sheet Floater." A 4-page bulletin describing the Dings Magnetic "sheet floater," which is a device used to facilitate the handling of stacked steel sheets during such production operations as: pressing, punching, and spot welding. Dings Magnetic Separator Co., 4734 W. Electric Ave., Milwaukee 46, Wisconsin.

40. Splinedicator. A 4-page bulletin SP615 on the Vinco composite indicator spline gage which can be incorporated into semi-automatic gaging equipment. This Splinedicator is available in plug and ring models and bench and portable type units. Vinco Corp., 9111 Schaefer Highway, Detroit 28, Mich.

41. Duplex Internal Grinder. A 4-page folder gives the complete specifications and details on the Bryant double-end internal grinder which is designed for grinding both a straight and a tapered bore at a single chucking. Bryant Chucking Grinder Co., Springfield, Vt.

42. Special Coatings. A 4-page folder describing 18 special industrial coatings for all types of metal using industries. Description includes data on methods of application, coverage, drying time, and characteristic uses on ferrous and non-ferrous materials. Service Products Division, Johnson's Wax, Racine, Wis.

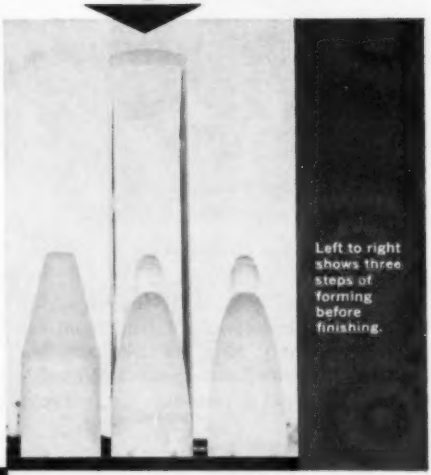
43. Punch Presses. A flyer describing Kenco Kompacs, which are a new series of presses available in 3- and 5-ton capacities. These presses feature a totally enclosed, but easily accessible, flywheel, crankshaft, connection rod, and ram. They were designed for single stroke punching. Kenco Mfg. Co., 5211 Telegraph Road, Los Angeles 22, Calif.

44. Ferranti Measuring Machine. A 4-page folder on the Ferranti Fi-22 coordinate measuring machine which calibrates the distance between holes and surfaces in two dimensions to an accuracy of better than .001". It then flashes the answers on two illuminated digital window panels. The Sheffield Corp., Dayton 1, Ohio.

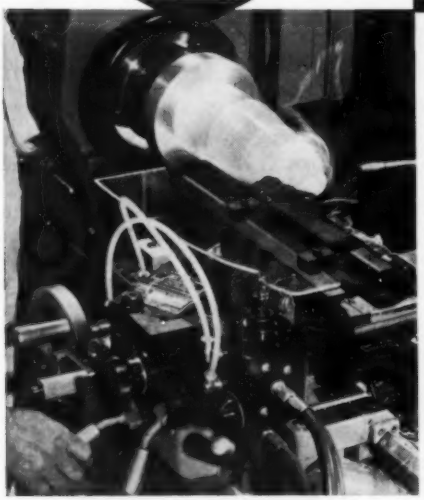
Impossible and Impractical

WITHOUT A TRUE-TRACE SERIES MARK "O" TRACING ATTACHMENT

*Machining Eliptical Lucite Domes to an Optical Clarity of 4 Fringes**



Left to right shows three steps of forming before finishing.



Saves over 500% in Man/Machine Hours

Pacific Optical Company, Inglewood, California, a Division of Chicago Aerial Industries, uses a True-Trace Mark "O" tracing attachment to machine lucite eliptical domes used in photographic work which are then finished to an optical clarity of 4 fringes. A five inch diameter lucite rod costing $175.00 ea. is rough and finish formed by a True-Trace Mark "O" attachment on a 12½" Cincinnati lathe holding extremely close spherical tolerances on diameter and overall length. Domes are then ground and polished by hand. Spokesman for Pacific Optical stated that this job would be impractical without the True-Trace attachment because hand operations could not hold critical tolerances necessary for optically clear surfaces.

Costly rejects have been eliminated and an estimated savings in man and machine hours of over 500% has been realized with their True-Trace Mark "O" Tracing Attachment. Perhaps True-Trace can make the impractical practical for your operations, too.

*Micro method of checking optical clarity.

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9830 Rush Street El Monte, California
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Manufacturer of 1, 2, & 3D tracer controls, attachments and components.

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See Number 45

45. Welding at Work. A 24-page booklet containing articles on welding from all over the country. Many of these articles feature time- and money-saving applications. Hobart Brothers Co., Troy, Ohio.

46. Wire De-Reelers. A 6-page brochure on wire de-reelers which are designed to suit any winding condition. Included are units for de-reeling high tensile strength wire at high speeds, for handling wire in pail packs and large coils, for maintaining constant wire tension independent of winding speed, and specially designed types for fine, medium, and heavy wires. Associated American Winding Machinery, Inc., 750 St. Ann's Ave., New York 56, N.Y.

47. Grinding Tools and Small Hole Drilling Equipment. A condensed catalog covering the Dumore line of portable grinding tools and small hole drilling equipment features brief descriptive details and ordering information. The Dumore Co., Racine, Wis.

48. "Tu-Lip" Counterbores. Bulletin TCR-2-61 fully describes Weldon's "Tu-Lip" counterbores which are available with straight or taper shanks. Each counterbore has improved cutting action due to the fast helix of its two flutes. The Weldon Tool Co., 3000 Woodhill Road, Cleveland 4, Ohio.

49. "Or-Bit" Tool Bits. This 6-page bulletin describes the new "Or-bit" series of tool bits which feature abrasive resistance and long life. Design details, materials of composition, functions, and advantages are covered. Morse Twist Drill & Machine Co., New Bedford, Mass.

50. Material Handling Systems. Catalog MF-100A covers the May-Fran lines of portable, steel belt, and custom conveyors. Also included is the new hinged steel belt handling system for portable or permanent installation. This line is suited for handling hot, heavy, and abrasive materials in rugged conditions of weather, water, or elevated temperatures. May-Fran Co., 1710 Clarkstone Road, Cleveland 12, Ohio.

51. Collets and Collet Fixtures. An 8-page bulletin on collets and collet fixtures which feature an internal stop for depth control, positive cam lock, and a hole for coolant. Zagar, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

52. "The Way to Better Semiconductor Production." A 20-page booklet describing the equipment now built by Lindberg for precision control in the production of semiconductors. Services, including laboratory, research, and design, are also included. Semiconductor Equipment division, Lindberg Engineering Co., 2450 West Hubbard St., Chicago 12, Ill.

See Number 52

NEW Brown & Sharpe Sawperior

GREATEST ADVANCE IN SLITTING SAWS IN 50 YEARS!

A super-finish saw so tough it can't scratch itself.

The mirror-like finish of new B&S "Sawperior" slitting saws mark 3 new developments that more than double production and make other saws virtually obsolete!

NEW Alloy High Speed Steel for Longer Life.

NEW Tooth Design for Fast Free Cutting!

NEW Super-Finish prevents Chips Seizing and Galling!

PRODUCTION BENEFITS

Shop tests prove the new tooth geometry and mirror-like finish give up to 4 times as much slitting production between sharpenings.

Super finish on sides permits use of less concavity or side clearance thereby providing a stronger saw section and a stiffer, more accurate saw.

Smooth side finish resists scratching, resists corrosive action of coolants and rust.

New saw design requires less milling machine power thereby allowing heavier cuts without strain or chatter.

New saw geometry and super finish sides give smoother surface finish in cut.

For that EXTRA Edge in Production!

Send for B&S Cutting Tool Condensalog . . .

Brown & Sharpe

Cutting Tool Division
Brown & Sharpe Mfg. Co.
Providence 1, Rhode Island

Use postpaid card. Circle No. 231

53. Depressed Center Abrasive Wheels. Bulletin ESA-244 details the depressed center abrasive wheels manufactured by Simonds Abrasive Co. These wheels are for portable discs sanders or right-angle grinders, and are made from abrasive grain and resinoid bond. Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

54. Drop Hammer. Bulletin 105-L-1 discusses the gravity drop hammer which features a new die-setting control. Other features include a non-slip rod clamp, nylon tips for knock-off dogs, and the Ceco Blowmatic Controller for programmed semi-automatic forging. Chambersburg Engineering Co., Chambersburg, Pa.

55. "How to Save Money and Cut Downtime with Metallizing." This 6-page bulletin uses the case history approach in telling how products can be salvaged or improved with modern metallizing. Examples covering flame spraying with metals in both wire and powder form cite dollar savings. Metco Inc., 1101 Prospect Ave., Westbury, L. I., N.Y.

56. Holding Magnet Design. A 4-page engineering bulletin explains the method for designing holding magnets and assemblies. Complete data for Alnico and Indox permanent magnets is included. Twenty-four basic designs for holding magnets and their performance characteristics are given. Indiana Steel Products division, Indiana General Corp., Valparaiso, Ind.

57. Automatic Indexing Machine. This flyer describes an automatic index table which lends itself to the production of multiple small parts, particularly for the electrical industry. Called the Ambamatic, it employs a hopper and a coil or bar feed. It is fully automatic. Imported Machinery Sales Co., Inc., P.O. Box 148, Berea, Ohio.

58. Roundness Analysis Chart. A sample analysis report form has been developed for Talyrond Roundness Measuring machines used for checking roundness, sphericity, concentricity, and coaxiality. Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

59. Nose Grinding Fixture. Catalog 19 discusses a nose grinding fixture incorporating a rocker motion for accurate and economical sharpening of gun drills. This fixture may be used with any bench or pedestal grinder. Eldorado Tool and Mfg. Corp., 342 Boston Post Road, Milford, Conn.

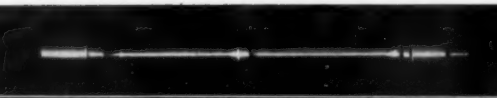
60. Sling Chains, Catalog DH-39-B gives the Accoloy Kuplex sling chain lines, including the various components which make up the Kuplex chain. Selection of proper components, work load limits, and assembly information are all included. American Chain division, American Chain & Cable Co., Inc., York, Pa.

"The maintenance man is a TV Western fan."

POWERTURN COPYMATIC

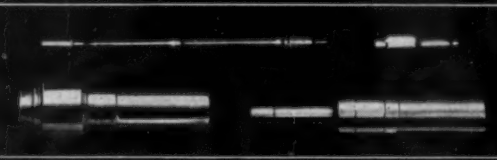
. . . quick-change artist!

One piece



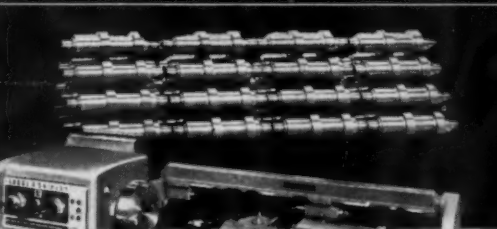
Precision

Job lot



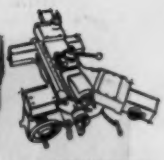
Quick Set-up

Production run



Minimum Cost

POWERTURN 90° COPYMATIC CARRIAGE



POWERTURN 45° COPYMATIC CARRIAGE

You've got a good thing going for you when you install a POWERTURN COPYMATIC. Choose engine lathe operation or instantly change over to tracer controlled duplication. Lodge & Shipley offers you a choice of 45° or 90° hydraulic tracing slides. No awkward projections, built for efficiency and operator convenience.

Whatever your choice, Lodge & Shipley has both. Write for literature describing each type of POWERTURN COPYMATIC . . . fine lathes with records such as: "saving $14,000 per year". . . "production increased 300%". . . "saves 85% of former time."

The Lodge & Shipley Co.,
3074 Colerain Ave., Cincinnati 25, Ohio.

your Lodge-ical choice in lathes . . .

Lodge & Shipley

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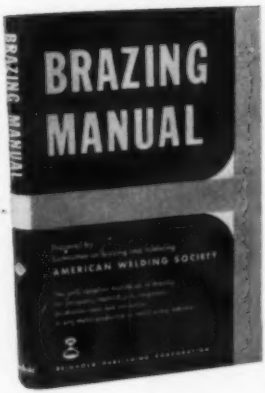
Book Reviews



BRAZING METALS
(By the Committee on Brazing and Soldering. American Welding Society. 202 pages. $4.75)

In one volume are the full up-to-the minute details of all brazing processes now used in the automotive, aircraft, refrigeration, electronics, and other mass-production metal industries. Separate chapters describe the principles, equipment and procedures involved in individual brazing processes. Special attention is given to joint design, to the properties of base and filler metals, to fluxes and atmospheres, and to the causes of defects together with corrective measures. Also included is a valuable quick-reference table showing metals in similar and dissimilar combinations, and filler metals to be used.

The Book Shelf, Hitchcock Publishing Co., Wheaton, Illinois.

APPLIED IMAGINATION
(By Alex F. Osborn. 379 pages. $4.50.)

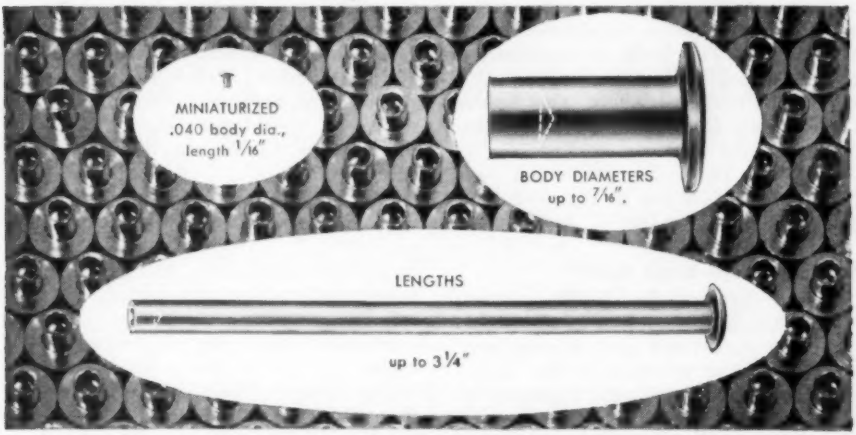
This book is especially valuable to men engaged in the continual search for new ways to reduce costs and to increase economical production. It was originally published in 1953 and first adopted by M.I.T.

Step by step, this book formulates the practical techniques by which creative imagination can be more productively utilized. The findings of extensive research show that the average person can almost double his or her ability to think up good ideas as a result of taking a semester course based on this text. Many corporations have included creative training in their own programs.

At the end of each chapter is a list of topics, exercises, and references.

The Book Shelf, Hitchcock Publishing Co., Wheaton, Illinois.

Look at this Size Range of Semi-Tubular Rivets... it's the way to lower cost



Miniaturized components and also large complete assemblies can now have all the money-saving advantages of using single and multiple automatic riveting. This is due to the wider size range of semi-tubular rivets now available and which can be used in conjunction with motor and pneumatic driven automatic riveting machines.

Today, there is hardly a fastening problem, involving even fragile materials, that does not warrant consideration of low-cost semi-tubular rivet setting.

Our Factory Riveting Specialists are ready to help you obtain the REAL COST FACTS on your own specific fastening problem. There is no obligation.

FOR YOUR FILES

Chicago Rivet Catalog describes 1388 standard tubular and split rivets and 25 single and multiple automatic rivet setters.

AIR-POWERED RIVETING

contains description and specifications of 8 single, multiple riveters—also rivet setters designed for automated operation.

Chicago Rivet & MACHINE CO.

947 So. 25th Ave., Bellwood, Ill. (Chicago Suburb)
Branch Factory: Tyrone, Pa.

Use postpaid card. Circle No. 233

HIGH-STRENGTH STEELS FOR THE MISSILE INDUSTRY

(Edited by H. T. Sumsion. 276 pages. $12.00)

Problems in development and application of ultra-high-strength metals for America's missile program are stressed in American Society for Metals' newest technical book for the materials and process engineer. Fourteen outstanding authors actively working with materials for aerospace requirements are represented. The book is comprised of papers presented at the symposium on the same subject during the Golden Gate Metals Conference in San Francisco in early 1960.

Contents include "Materials and Fabrication Problems in Pressure Vessels," "Stress Corrosion of Aircraft and Missile Steels," "Fracture Theory in Pressure Vessels," "Pressure Vessel Reliability," "NASA's Program—High-Strength Sheet Alloys," "New Ultra-High-Strength Steel for High-Performance Rocket Motor Cases," "Fabrication Techniques for Rocket Motors," "Shear Spinning in Fabrication by Deep Drawing" and "Future Applications of High-Strength Steels."

The book was edited by H. T. Sumsion, Lockheed Missiles and Space division, Sunnyvale, Calif., and prepared at Lockheed. More than 200 illustrations, tables, charts, and graphs are included.

The Book Shelf, Hitchcock Publishing Co., Wheaton, Illinois.

"Down With Unit Cost"

(16mm color-sound motion picture)

Production cost control in the highly competitive national and international metal working markets is the theme of Master Chemical Corp.'s 16mm color-sound film, "Down with Unit Cost."

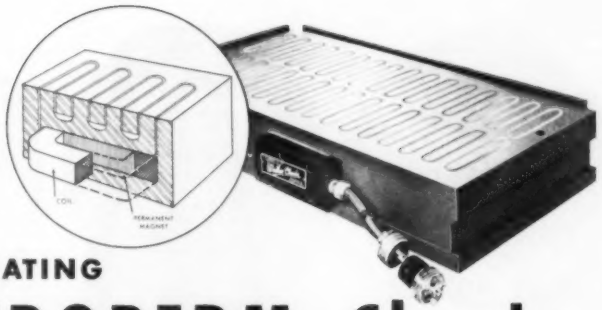
Touching the widespread problem of foreign competition, the 17-minute film outlines the "Unit Cost Formula," developed by Master Chemical and Dr. Milton C. Shaw, professor-in-charge of the metal processing department at Mass. Institute of Technology. The dramatic influence of proper coolant selection in long range cost reduction is discussed.

The fixed elements of the production cost picture (cost of machine, operator, cutting tools, downtime for tool changes, machine maintenance, and general plant overhead) and the variables of speeds and feeds to balance these fixed costs are dramatized to point the way to increased quality production at a decrease in unit costs.

Following the problem of accurately determining high efficiency in the specified machining operation (best combination of time per piece-cost per piece ratio) concluding segment indicates how, through Dr. Shaw's research, proper selection of the modern chemical coolant alone can further increase production rates by allowing even higher, faster speeds.

The Master Chemical Corp., 13 N. Huron St., P.O. Box 857, Toledo 1, Ohio.

"I think the boss is worrying too much about losing his shirt."



NEW

COLD OPERATING

ELECTROPERM Chucks

Combining the advantages of both electric and permanent magnetic chucks, this new cold operating chuck represents the ultimate in precision for large magnetic chucks. The chuck is only energized and deenergized electrically while permanent magnets do the actual holding during machinery operation. Energizing and deenergizing cycles are so short that heat and accompanying distortion are eliminated. The cold operating Electroperm Chuck is so stable dimensionally that it will hold the precision tolerances of the machine tool upon which it is mounted.

Write for Catalogue WPL60 showing the complete Walker line of demagnetizers, magnetic and vacuum chucks.

O.S. Walker
COMPANY, INC.
ROCKDALE ST., WORCESTER 6, MASS.

WALKER CERAMAX CHUCKS

Versatile Walker Ceramax Chucks featuring ultra-permanent ceramic magnets are successfully applied on grinders, millers, lathes, shapers and many other type machines. Powerful, rugged and stable, these permanent magnetic chucks can handle large heavy pieces or small thin stock with equal ease. The all steel top plate minimizes redressing and provides a long wearing precision work surface. Focused flux keeps the magnetism down near the top plate and away from the spindle and other machine parts. Alternating north and south poles of *equal* strength keep cutting tools demagnetized.

MILLING **TURNING** **GRINDING**

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UNIVERSAL
KWIK-SWITCH
TOOL HOLDER
permits
tool changes
in ten seconds!

UNIVERSAL CHUCKS
for every purpose

BORING CHUCK

STANDARD COLLET CHUCKS

FLOATING COLLET CHUCK

Write today for complete catalog of Universal Engineering products.

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UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 10, MICHIGAN

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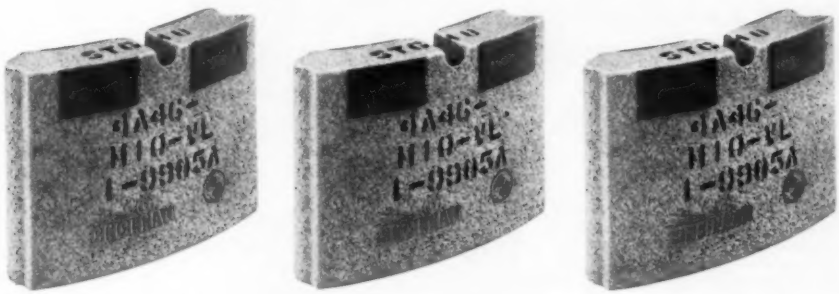
POSITIVE DUPLICATION—EVERY TIME!



These "fingerprints" of a tree will always duplicate characteristics by which an expert can positively identify all cross-sections from the trunk of that tree.

But you don't have to be an expert to get Positive Duplication—when you use these CINCINNATI PD* SEGMENTS, and *all* CINCINNATI GRINDING WHEELS.

YOU GET (PD) UNIFORMITY

Cincinnati supplies you with wheels of uniform excellence, because of the unique PD manufacturing process which involves 36 separate and unvarying quality controls.

Every step, from grain mix to final inspection, is directed to uniformity of product. For example, while vitrified wheels are being fired, automatic recording analyzers keep sampling the kiln atmosphere to maintain desired oxygen content throughout the firing process.

RESULT: DEPENDABLE PERFORMANCE

You can *depend* on PD WHEELS because each reorder wheel gives you exactly the same good job as the original.

Using PD WHEELS you will find production going up, and costs going down . . . *to stay!* This is the promise —and the performance—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of specialists trained by the Cincinnati Milling Machine Company. Their wide experience in job set-ups and grinding operations is at your service.

Just call your CINCINNATI PD GRINDING WHEELS Distributor or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

PD POSITIVE DUPLICATION

CINCINNATI GRINDING WHEELS

*Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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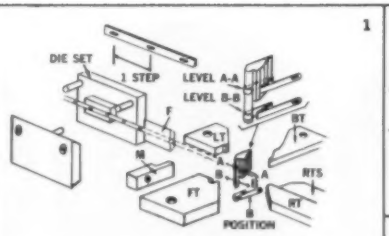
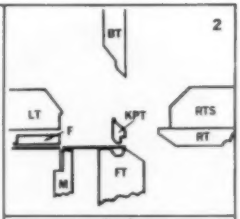
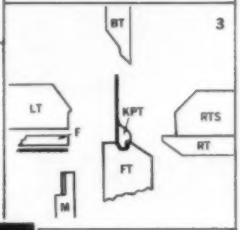
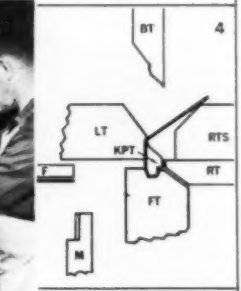
KEY:

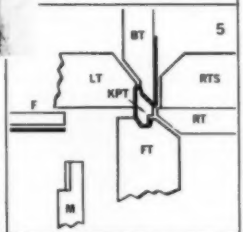
FT	Front Tool
LT	Left Tool
BT	Back Tool
RT	Right Tool
RTS	Right Tool Secondary
KPT	King Post Tool
F	Female Cut-off
M	Male Cut-off

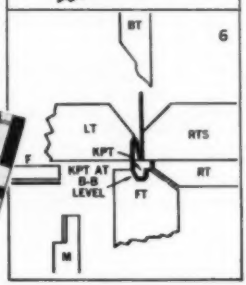












ELIMINATE SECONDARY OPERATIONS WITH THE NILSON FOURSLIDE

By combining stamping and forming in one FOURSLIDE Machine, miniature, precision electronic spring temper parts are produced at high rates.

FOURSLIDE operator inserting a die set in a built-in press.

A 5/8" long Contact Spring of phosphor bronze, 2 Nos. hard (spring temper), is produced on a NILSON Model S-O-F FOURSLIDE at speeds of 350/minute. Tolerances are held to ±0.0005" when required. The piercing of the hole in the Contact Spring is done in the Built-in Press of the NILSON S-F Model or in a Model 00 using a standard Horizontal Press Attachment.

The oblong hole in the Contact Spring is pierced in the Die Set (Figure 1). Then ribbon metal is fed into the forming area, where it is formed around the King Post Tool in plane A-A by the side tools (Figures 2-5). In Figure 6, the King Post Tool has been raised to the B-B level, so the Right Tool Secondary can final close the double bend. This 5/8" Contact Spring must compress to .032" and spring back to .050", with the sides parallel within .010 T.I.R.

SEVENTEEN MODELS of NILSON FOURSLIDES provide a large versatility to meet your ribbon metal and wire forming requirements. There are SEVEN S-F and S-T Models with the COMBINATION FOURSLIDE and BUILT-IN PRESS, providing horizontal press capacity from 5 to 75 Tons. Standard NILSON Press Attachments rated 1/2 to 7 Tons, for NINE of their TEN Wire Forming Machines, also can be used for additional press capacity on the S-F Models.

Full explanation of the NILSON FOURSLIDE PROCESS and tooling examples NOW available in the NEW NILSON "Design & Tooling Handbook". Write for your copy today.

NILSON

The A. H. NILSON MACHINE CO.
626 Bridgeport Avenue, Shelton, Connecticut

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T-J CUTTERS

Designed To Do *More* Jobs . . . Produce *More* Work
. . . Save *More* Production Time and Cost

Proved, definitely, as the cutting tool for the die-sinking industry, T-J now offers an expanded cutter line for the precision milling of today's high speed, high production manufacturing. The new line has been designed to do more, as well as add to individual cutter life. Cutters feature a high helix angle, double back-off, right or left hand spiral, and flats on the shanks for set screw type chucks. Write today for Catalog No. 259 and complete details to The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Mich.

Representation in all major areas, including Canada.

T-J **TOMKINS - JOHNSON**
RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

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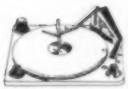
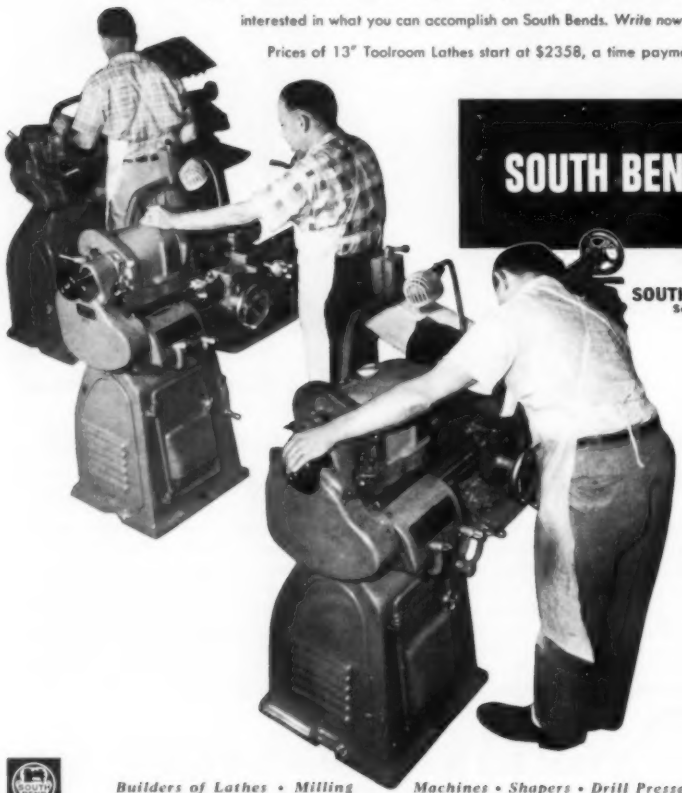
Sweet Music for Tomorrow

Machining a turntable in the Model Shop of V-M Corporation, Benton Harbor, Michigan.



Just as manufacturers the world over choose famous V-M Record Changers for their dependability and full fidelity of performance, V-M chooses South Bend 13" Toolroom Lathes. They demand exacting model work and they get it on these precision lathes—every time. If your experimental or production work require exceptional tolerances and fine finishes, you'll be interested in what you can accomplish on South Bends. *Write now for complete information.* Prices of 13" Toolroom Lathes start at $2358, a time payment plan is available.



SOUTH BEND LATHE

SOUTH BEND LATHE, Inc.
South Bend 22, Indiana

Builders of Lathes • Milling Machines • Shapers • Drill Presses • Pedestal Grinders

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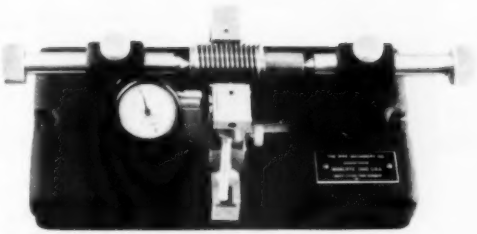
GAGES GET A FAST TRIAL AND FAIR SENTENCE...

with Pipe Machinery's Drunken Thread Checker

Easy to set up, easy to operate, Pipe Machinery's amazing new Drunken Thread Checker tries gages for helix deviation, or drunken thread, and passes sentence all in a matter of seconds! The finding it makes — a direct reading of the degree the helix deviates from normal — is final and incontestable.

A diameter over wire check of gages provides insufficient evidence to enable you to render an "acceptable" verdict. In order to be a fair judge in your gage inspection, a check for drunken thread, in addition to a careful examination of, among other things, lead, angles and pitch diameter is always required.

The instrument shown is easily adapted to product inspection with male or female centers.



For more complete information write us on your company letterhead today.

THE PIPE MACHINERY COMPANY
29100 Lakeland Boulevard • Wickliffe, Ohio • Greater Cleveland

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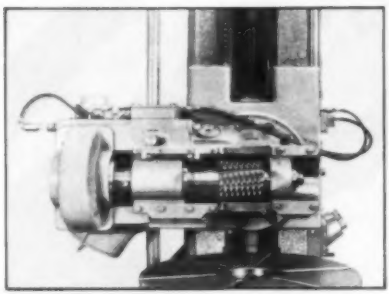
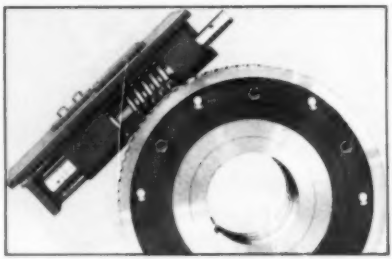
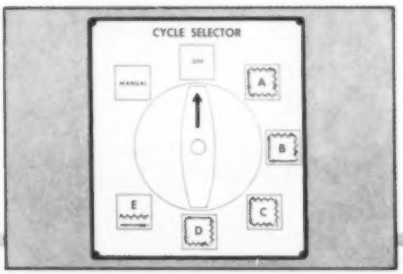
On G&E Gear Hobbers you can get features like these...



Automatic hob shift apportions wear over entire hob length, throughout roughing and finishing operations. Hob spindle bearings rigidly clamped during cut.



DUALEAD worm gearing assures accurate indexing under heaviest production, at high operating speeds. Worm thread design simplifies adjustment, improves backlash control, assures uniform motion in both directions of rotation.*



Automatic Quadcycle with rough and finish cycle option makes gear cutting completely automatic. Operator needs only to load work and push RUN button. Specific cycles in an operation are selected by a single setting-dial.

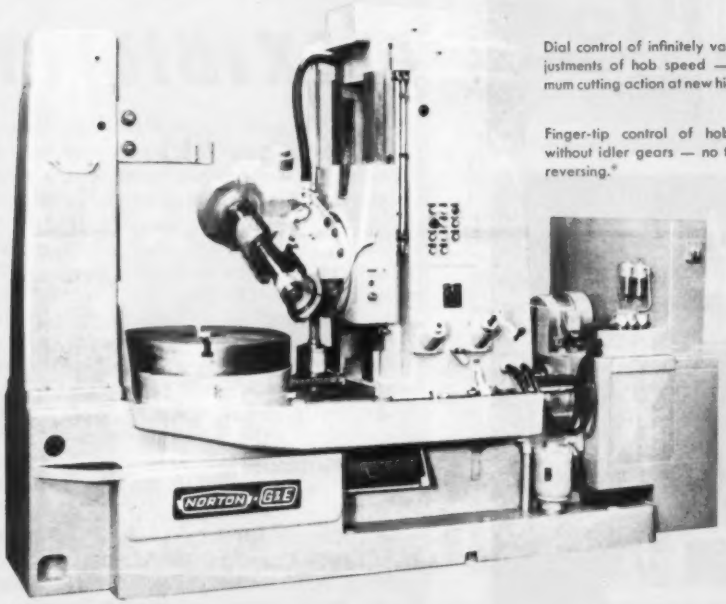
plus advantages like these...

- Hydraulic counter balance of hob slide — variable to meet cutting conditions — eliminates backlash and chatter, permits high hobbing speeds, lengthens hob life.
- Tracer-controlled crown hobbing accurately produces a total amount of crown within a few "tenths", per inch of face. Simple inexpensive template locates high point and amount of crown anywhere on gear face. Also applicable to highly crowned couplings.

*Standard equipment

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

with everything under control!



Dial control of infinitely variable adjustments of hob speed — for optimum cutting action at new high speeds.

Finger-tip control of hob reversal without idler gears — no time lost in reversing.*

Outstanding accuracy has long established G&E Universal Gear Hobbers as the most dependable machines for practically every gear cutting application.

Precision performance is built into every G&E Hobber . . . with many advanced optional features like the ones described here . . . and with a simplified, control system that increases automatic, cost-cutting benefits in sustained high production.

G&E Hobbers are made in ten sizes to produce gears from one inch to fifteen feet in diameter, with most features available on all.

For expert aid in selecting gear hobbers and other G&E machines, see your G&E distributor — or write to Norton Company, G&E Division, Worcester 6, Massachusetts.

NORTON
MACHINE TOOLS
Making better products
. . . to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines

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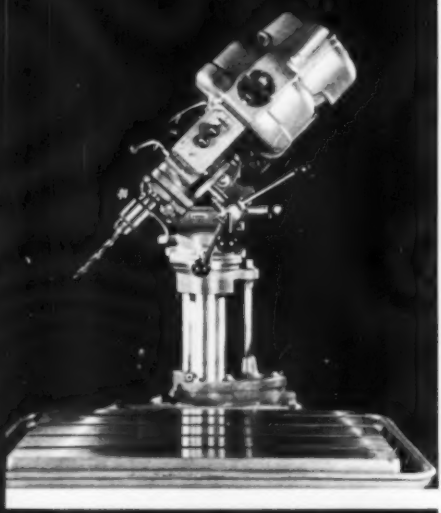

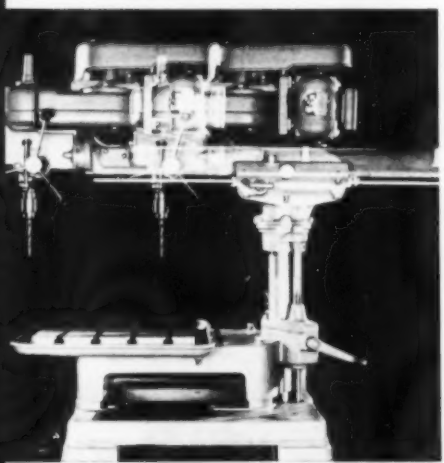

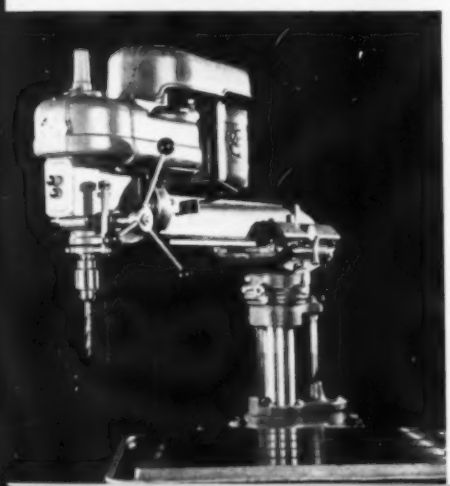

Any way you look at it

YOU CAN'T BUY MORE *FLEXIBILITY*

At a low price of $760.00* Walker-Turner "Light-Heavyweight" Radial Drill Presses do the work of machines costing more than twice as much! For fast set-up in drilling of large or heavy stock and to solve special horizontal or vertical drilling problems, they offer these important extras: *Extra wide drilling range*—head moves 18" on traveling ram, swivels 360° around column, tilts 45° left or right. *Extra speed versatility*—choice of 15 speeds from as low as 110 rpm to as high as 8300 rpm. *Extra capacity*—drills to center of 62" circle, your choice of 4¼" or 6" spindle travel. But the biggest extra is the extra savings you'll enjoy on fixturing and set-up time when you put this rugged machine to work on your toughest drilling jobs.

Visit your Walker-Turner Distributor (listed in the Yellow Pages under MACHINE TOOLS or TOOLS). Learn for yourself why more people in metalworking call Walker-Turner the *value* line.

**Model 1612-12*

Get information on all 24 models of the W-T Radial Drill Press. Write for FREE Catalog: Rockwell Manufacturing Company, Walker-Turner Division, Dept. WG 23, 400 North Lexington Ave., Pittsburgh 8, Pa.

WALKER-TURNER
"LIGHT-HEAVYWEIGHT" MACHINE TOOLS
another fine product by
ROCKWELL

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meet the complete family

of special

Vanadium-Alloys

Plastic mold steels

a grade for each specific mold requirement!

MC (Mold and Cavity)

Supplied annealed—or heat treated to 300 Brinell with high core hardness even in sizes to 20 x 10 inches. When carburized and oil quenched, provides high surface hardness.

Ni-Mold

A low carbon, chrome-nickel steel for cavity work when carburized surfaces are desired with exceptionally high core toughness.

Speed-Cut 300

Free machining, medium-carbon steel preheat-treated to 300 Brinell. Recommended for mold parts such as backing plates, cavity plates and spacer blocks.

Hotform V

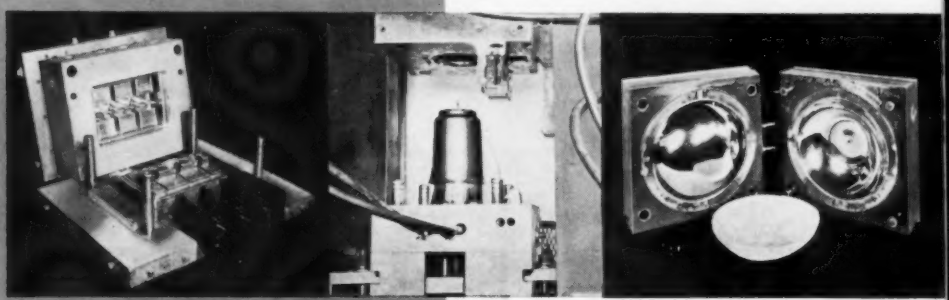
New improved Hotform "V" resists high temperatures, chromium plates with ease, is ideal for compression molding of silicone resins, etc., and long injection runs of nylon or corrosive vinyls.

Colonial No. 6

Manganese, oil hardening—closely retains size and shape after tempering. Low hardening temperature, good machinability, excellent for long runs in small cavities, either injection or compression.

Air Hard

Deep air hardening, non-deforming, good resistance to abrasive wear—valuable for compression, transfer or core molding. Intricate or complicated shapes call for this maximum-stability steel!



FIRST QUALITY · TOOL & SPECIAL STEELS · VA

WRITE for new 12-page bulletin on Properties and Selection of our Plastic Die Steels—Free on request.

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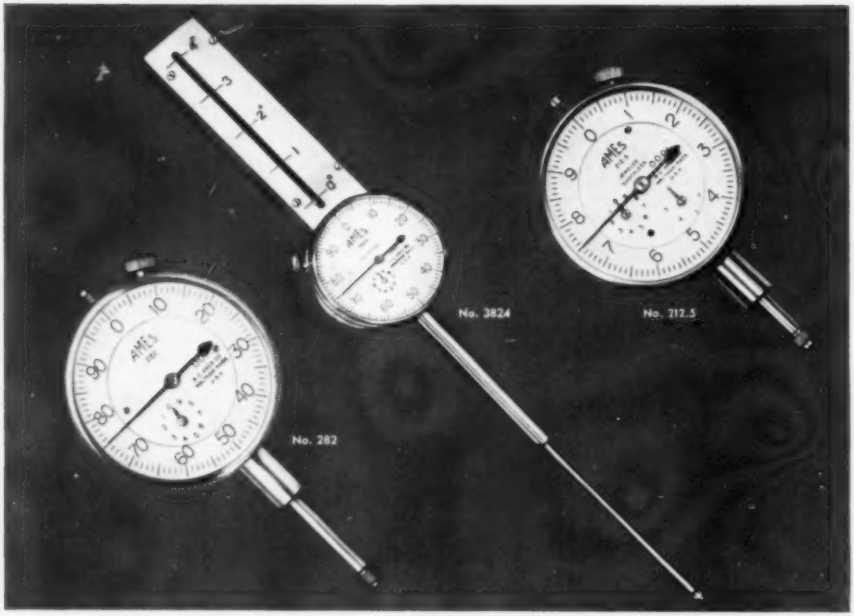
VANADIUM-ALLOYS STEEL COMPANY

GENERAL OFFICES: LATROBE, PA.

AMES *Masters of Measurement*



LONG-RANGE DIAL INDICATORS

Use Them for Checking: long slide travel, large cams, deep recesses or other dimensions requiring indicator spindle travel up to 12".

Features Include: large diameter dials, widely spaced dial graduations, movable dials, replaceable contacts and count hands.

Attachments: rubber dust guards, tolerance hands, lift levers, special backs, contact points, etc.

For literally hundreds of measuring, indicating and comparing operations, you'll find Ames standard and customized gauges and indicators unerringly accurate and amazingly durable . . . *You're asking for the best when you specify Ames!*

B. C. AMES CO., Waltham 54, Mass. Representatives in Principal Cities – In Canada, H. C. Burton, Co., 166 Rebecca Street, Hamilton.

B.C. AMES CO.

MANUFACTURERS OF MICROMETER DIAL INDICATORS, DIAL GAUGES, ACCU-FLOW AIR GAGES, PORTABLE TRANSISTORIZED COMPARATORS

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SPIROPOINT*

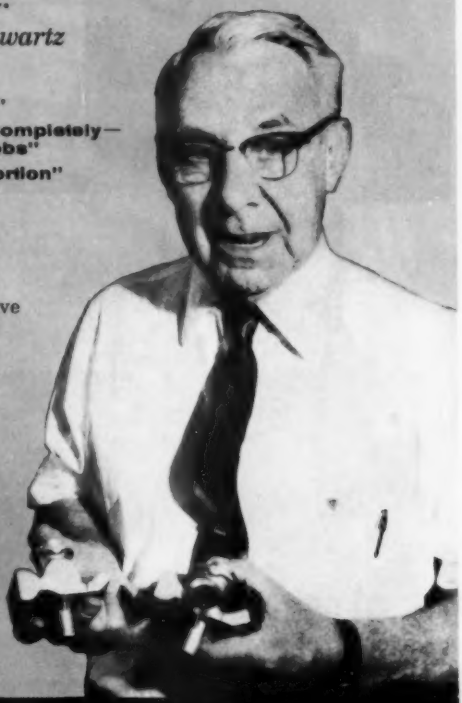
makes twist drills produce at Breeze Corporations, Inc.

says Works Manager Harold Schwartz

"...50% greater drill life"
"...up to 40% saving in drilling time"
"...centering operations eliminated completely—reaming unnecessary on many jobs"
"...70% reduction in workpiece distortion"

Breeze Corporations, Inc. of Union, New Jersey, executes complete design and production of precision electrical, electro-mechanical, and hydro-mechanical components and systems. Drilling costs have been cut at Breeze because, with spiral points, all holes are "right on center, round, smooth, and right to size—*at both ends!*", Mr. Schwartz stated.

* Cincinnati SPIROPOINT® Drill Sharpener applies the new spiral point geometry to standard twist drills in a matter of seconds.



Works Manager Schwartz holds "Guillotine" safety device used on helicopter hoists. Production drilled holes 1½" deep are held to .001" tolerance on straightness.

Aluminum slip ring housing 3' in diameter has 576 holes. The ¾" holes are drilled through ¾" metal with spiral point drills in one-third the time normally required. Change in shape of the relatively fragile casting was negligible.

¾" drilling of this missile control launcher part is held to .001" tolerances on hole location and diameter—center drilling and reaming operations eliminated.

CINCINNATI LATHE AND TOOL CO.
Cincinnati 9, Ohio
HYDRASHIFT Lathes • CINCINNATI Drilling Machines • SPIROPOINT Drill Sharpeners

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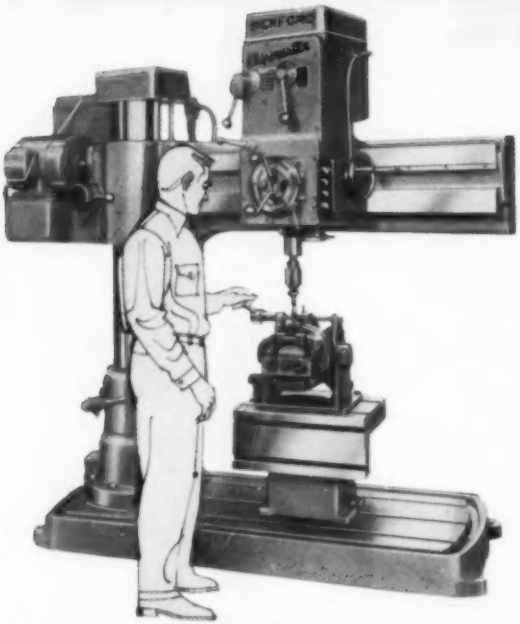
THE NEW BICKFORD 9″ RADIAL



. . . the 9″ radial that's loaded with big machine features

- Fingertip automatic tapping reverse standard.
- Dial-set automatic tapping reverse standard.
- Centralized controls — located on the head for faster machine manipulation.
- 5-hp reversing motor (3-hp optional) — eliminates clutches . . . simplifies maintenance.
- Rock-solid column — shortest, with no loss of capacity and heaviest of any radial in its class . . . preloaded tapered bearings top and bottom.
- Rugged spindle — mounted in 3 preloaded precision bearings.
- Rigid arm — double box section stops deflection — 3 and 4-ft lengths.

biggest dollars' worth ever offered in a 9″ machine

Here's a 9″ Bickford Chipmaster with big machine features . . . at a price well below many less productive radials in its class.

Here's speed, safety, ease of operation . . . in a radial that's designed to help the operator. All controls are grouped at the head, within easy reach. Fingertip automatic tapping reverse, pushbutton spindle control, and fast-acting gearshift levers cut minutes off of every machining operation . . . increase accuracy and put more work on the floor each day.

Ask your Giddings & Lewis distributor to show you a comparison between the new 9″ Chipmaster and previous machines. It proves no other 9″ radial gives you so much value for your machine tool dollar. There's no obligation, of course.

Get all the facts on this new radial!

A new 16-page catalog R-9 describes standard features . . . lists the complete capacities and specifications. *Ask for a copy today.*

BICKFORD CHIPMASTER RADIAL DRILLING MACHINES

GIDDINGS & LEWIS

GIDDINGS & LEWIS

GIDDINGS & LEWIS MACHINE TOOL COMPANY, Fond du Lac, Wisconsin

BICKFORD . . . world's most complete line of drilling machines—3 to 50 hp . . . radials to 34″ . . . uprights to 39″ . . . ultra-precision Numeridrills . . . portables and universals.

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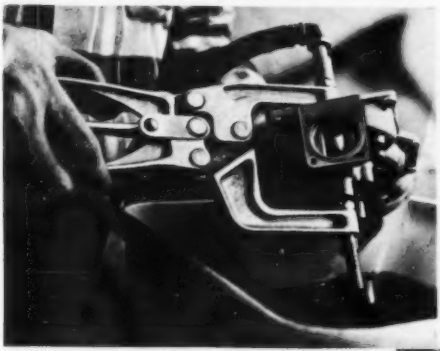
B61-1

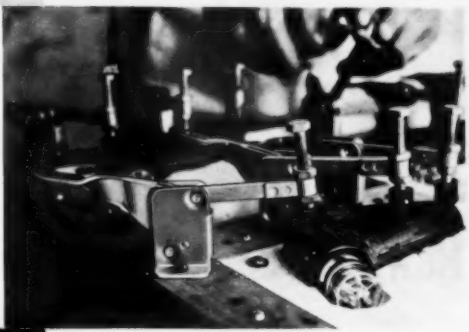
Look what clamps are doing!



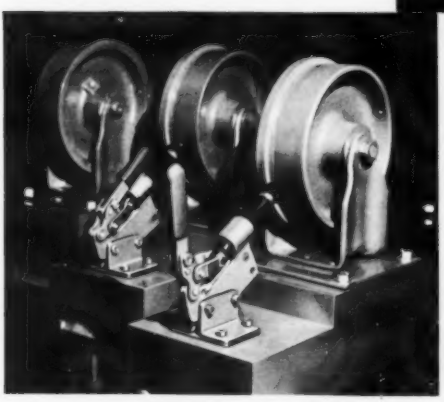
Practical uses of Wespo Toggle Clamps and Pliers that may suggest ways you can save

Toggle plier serves as low cost fixture for testing castings The air line is connected through one jaw of a Wespo Model 522 Toggle Plier. The plier is then clamped onto the casting and air applied by a foot control. Immersing the casting into a tank quickly spots any defects. Patented "Quick trigger" feature of the Model 522 instantly releases the casting; speeds testing. Rugged, lightweight Wespo toggle pliers are available in various jaw capacities and sizes.

Holding these glued parts together while drying is a simple task with Wespo Horizontal Bar-Type Toggle Clamps. Neoprene-capped spindles prevent damage to plastic surfaces, yet securely hold the parts during the drying operations. Wespo toggle clamps are available in more than 80 types and sizes. So, the next time you think clamps, think Wespo!



Simple, low cost "parking brake" for this track-operated frame is provided by a Wespo Push-Pull Clamp equipped with a neoprene-capped spindle. "Brake" is quickly applied or released by a simple flick of the wrist. Wespo Push-Pull Clamps are available in various sizes and holding pressures and are ordinarily used on holding fixtures where push or pull clamping is required.



FREE CLAMP CATALOG!
Ask your Wespo distributor for your free copy of this 16-page Wespo catalog. It will help you quickly select the right clamp for every clamping job.

WESPO

DIVISION OF VLIER ENGINEERING CORPORATION
26935 W. Seven Mile Rd., Detroit 19, Michigan
Formerly West Point Manufacturing Company

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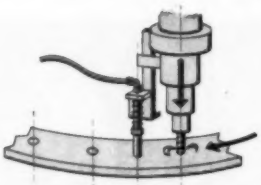
How 1 pneumatic recorder at GE led to 14 more

The first one did such a good job that General Electric's Evendale, Ohio, plant bought an additional 14 Sheffield pneumatic recorders, for application to automatic indexing jig borers.

An adjustable bracket on the quill holds a floating air spindle. After each hole is bored, the spindle enters the hole, automatically records the bore size. If the hole is within limits, the next hole is bored. If the diameter is not within specifications, the operator is warned by both lights and a buzzer.

The Sheffield Pneumatic Recorders proved so reliable that dimensions recorded at the machine have—in many cases—eliminated the need for subsequent inspections.

Write for Bulletin PREC.-212.



The **SHEFFIELD** Corporation Dayton 1, Ohio

A subsidiary of The Bendix Corporation

Inspection Gages, Dimensional Control Instruments, Machine Controls, Automatic Gaging & Assembly Systems, Measuray® X-Ray Thickness Measuring, Crushtrue® & Multiform® Grinders, Cavitron® Ultrasonic Machine Tools, Press-Pacer® Transfer Units, Large Dies, Tooling, Contract Manufacturing.

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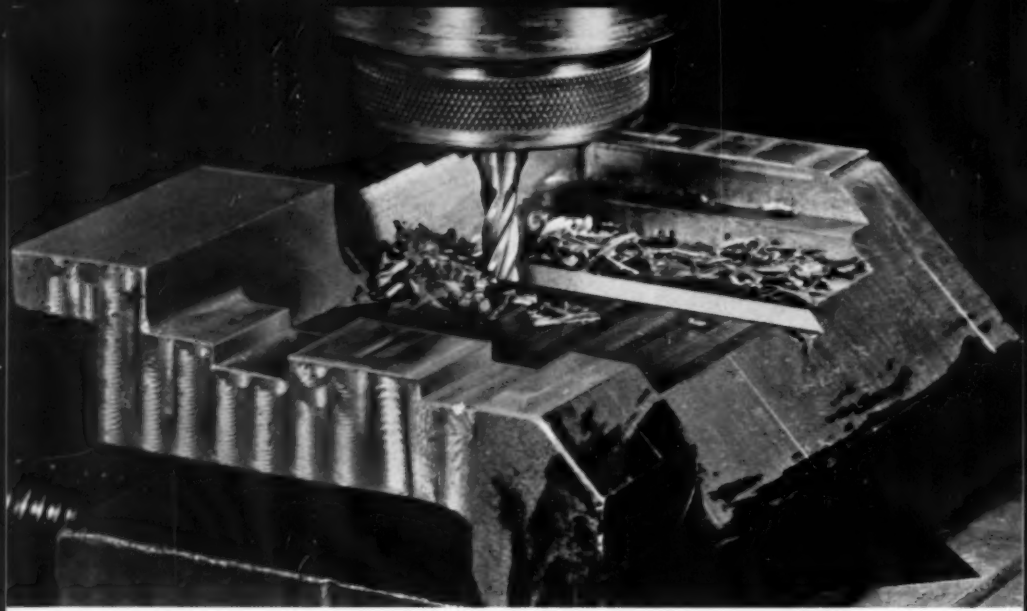
The story behind the chips



Savings In Time—Lower Tool Costs—Finer Finishes—More Accurate Cuts

Many types and sizes of *standard* Putnam End Mills are considered as "specials" by other manufacturers. Thus, Putnam customers get off-the-shelf deliveries that get their end mills on the job faster and at lower cost than "specials."

On the job, Putnam End Mills again save time and money. Designed for fast, free-cutting action, these end mills have extra long life. They will stand up when operated at high speeds and heavy feeds—on the toughest metals they really "hog-in" to quickly remove stock.

For applications requiring accurate cuts, Putnam's attention to manufacturing details and rigid quality control assures complete uniformity in each end mill. Also, users often find the exceptionally fine finishes obtainable with Putnam End Mills eliminate the need for grinding or hand finishing.

A pile of chips—the milling job is completed. But, for users of Putnam End Mills, there is always a story of unusual savings and benefits behind that pile of chips.

PUTNAM
TOOL COMPANY
2981 CHARLEVOIX AVE. • DETROIT 7, MICHIGAN

MILLING ALUMINUM – Putnam has a complete line of *standard* end mills that are specifically designed for efficient milling of aluminum and aluminum alloys.

Over 1800 Standard Types & Sizes of Putnam End Mills

Now you can order standard end mills ranging in diameter from 1/32″ to 6″ and get off-the-shelf delivery. In the Putnam line of over 1800 standard types and sizes are many end mills that are considered as "specials" by other manufacturers.

For example, in the MITEE-MITE series of standard end mills, diameters as small as 1/32″ are available. Thus, your milling, profiling, routing or engraving jobs in small or hard-to-get-at areas can now be done without special tooling.

Regardless of your requirements, there probably is a Putnam standard end mill that will exactly meet your needs. You can get all the superior Putnam cutting qualities for milling: intricate shapes, deep cuts, tough materials, aluminum, etc. – without purchasing costly specials.

Contact your local Putnam Distributor, he will recommend the best end mill for each specific job and give you quick delivery from his stock.

ON THE BIG JOBS—Putnam Postiv-Lok will cut your costs over 25% on end mills 1½″ in diameter and larger. Quick delivery from stock on diameters to 3″.

A plant that specializes in the manufacture of end mills

Putnam end mills are made by specialists who work in a modern plant having the finest equipment available. Every end mill is machined from high speed steels of rigid Putnam analysis, heat-treated in our own plant and produced under close quality control. Because *end mills are our business*, we carefully guard their reputation for quality and performance with individual inspection on a score of important details.

DISTRIBUTORS
IN CITIES
COAST TO COAST

this plate paid for itself in 11 hours...

...and is still tapping 4400 holes per hour one year later!

The only tooling needed was the 15-position dial plate to hold the parts. The plate was bolted simply to a standard Snow Dial Index fixture on a standard Snow universal tapping machine.

We made the plate for our customer for $165.00. It arrived in his plant 6 days after he delivered a box of blank parts to us. With the plate went a tag showing Snow machine settings, and estimated hourly production based on the *test run already made* in our own shop. Time required for customer to set up the new dial plate was ten minutes!

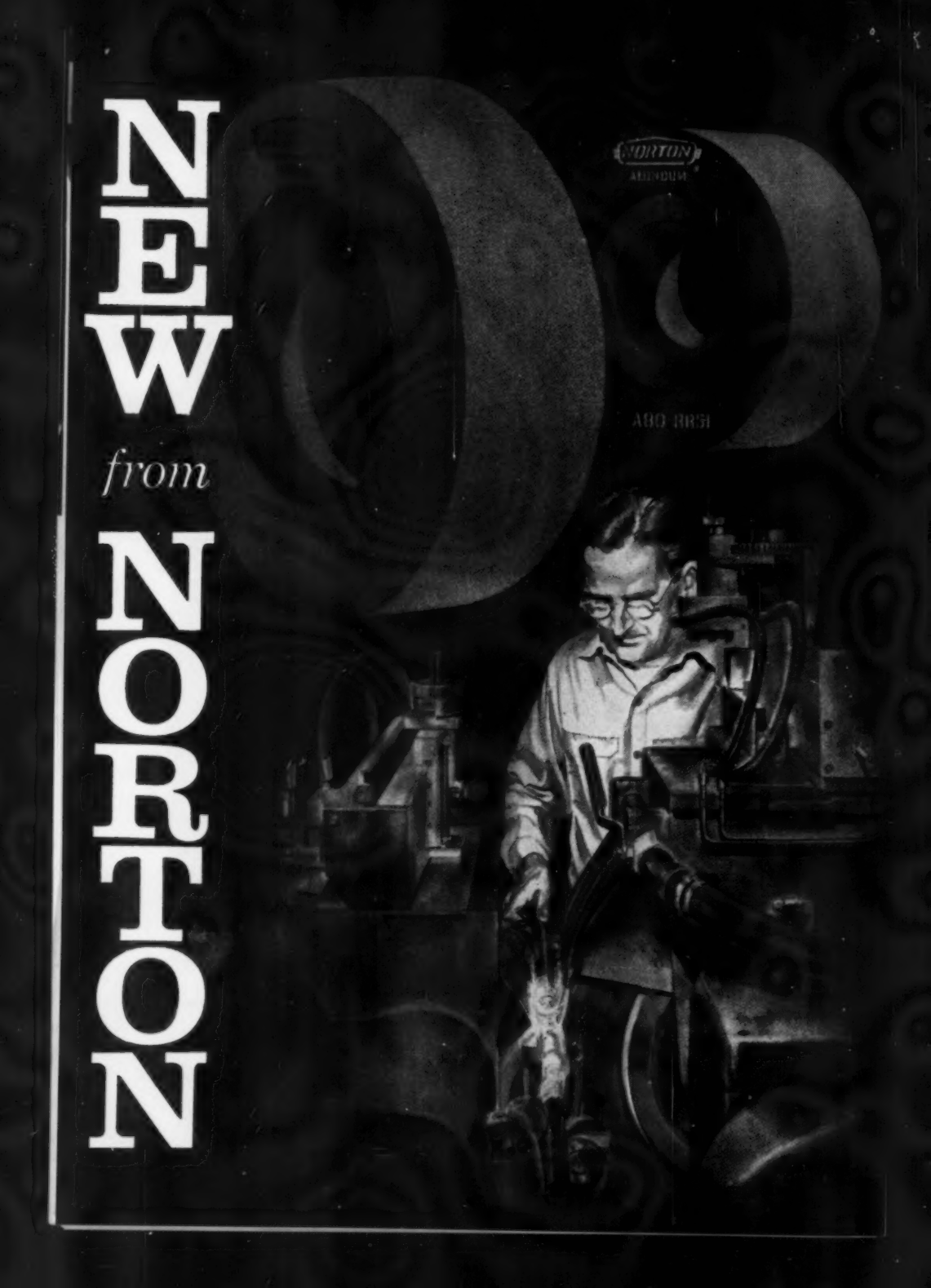
Standard universal Snow machines for drilling, tapping, or threading are available in vertical, horizontal or angular models. Their modest price will amaze you. They reduce changeover time, and cut tooling costs to a ridiculous minimum. 28 different types of standard air-operated fixtures are available from stock. On your next job, let us show you what the Snow method can do. Submit samples and prints.

Snow Manufacturing Company, 435 Eastern Avenue, Dept. B, Bellwood, Illinois (suburb of Chicago).

SNOW *master fixtures save dollars and days in tooling costs.*

Use postpaid card. Circle No. 250

NEW *from* NORTON



The top-ranking wheel team for centerless grinding

The 23 ALUNDUM grinding wheel and R51 feed wheel . . . the best performing, longest lasting combination on any centerless grinder.*

Although centerless grinding is a two-wheel operation, it doesn't need to be a two-brand buying chore.

HERE'S WHY.

Norton now offers this outstanding wheel team for production-precision and economy in centerless grinding . . .

- *The 23 ALUNDUM grinding wheel for premium performance at non-premium price.*
- *The R51 bond feed wheel for positive feed and accurate work support plus long service life.*

23 ALUNDUM Abrasive is no ordinary aluminum oxide. In price it is *non*-premium . . . but with *premium* toughness and sharpness . . . and fast, free cutting action that means *premium* performance.

23 ALUNDUM wheels have other important advantages: friability, which minimizes dressing . . . uniform duplication, for uniform performance . . . and versatility, for grinding all steels, Meehanite, aluminum and many other metals.

Teammate R51 is not just another feed wheel. This special Norton abrasive-and-bond combination has thoroughly proved the importance of the feed wheel to accurate, low-cost centerless grinding.

Reports from plants all over the country credit R51 wheels with exceptional performance, minimum dressing and no slipping or chatter. And Norton quality control keeps them uniform from wheel to wheel and lot to lot.

On the new Norton No. 2 Straddle-Bearing Centerless Grinder — or on any other machine of this type — 23 ALUNDUM grinding wheels and R51 feed wheels make your best matched team for low cost, volume production centerless grinding. For expert aid in wheel selection, and a test run in your plant, see your Norton Man, a trained Abrasive Specialist, or your Norton Distributor, NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

*Trade Mark Reg. U.S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

W-2012

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

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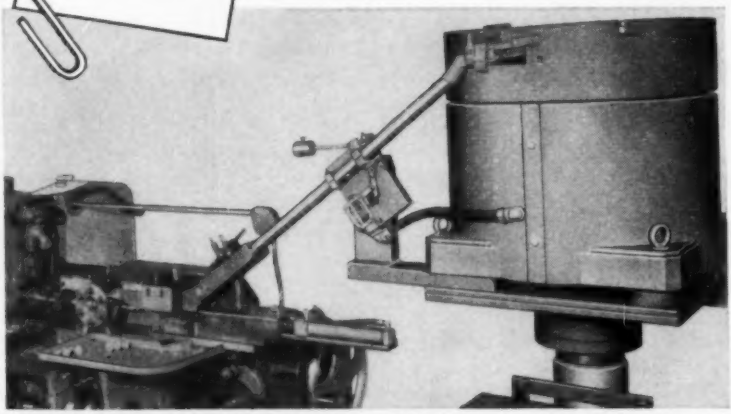
SYNTRON

CASE HISTORY

another successful application in the

No. 3540

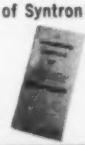
MACHINERY MANUFACTURING INDUSTRY



SKINNER ELECTRIC VALVE DIVISION, New Britain, Conn. increases second operation work as much as 30% with SYNTRON PARTS FEEDERS

A recent improvement developed by Brown & Sharpe Company, Providence, Rhode Island, is the automated loading of automatic screw machines. This improved method which drastically improves loading efficiency utilizes Syntron vibratory bowl-type Parts Feeders which automatically supply parts in an oriented single-line, rate-controlled feed through a Brown & Sharpe designed automatic turret loading arrangement to a Skinner Power chuck. Skinner Electric Valve Division management says, "The Syntron Parts Feeder is very versatile and will accommodate parts of different size through the same Feeder. It is also trouble-free." With regard to their performance, Skinner Electric Valve offers, "Installations of this equipment in the field have increased the efficiency on second operation work as much as 30%."

For your parts handling application, why not investigate the possibilities of Syntron electromagnetic vibratory bowl-type Parts Feeders.



Write for a Syntron catalog section on Parts Feeders and the name of the representative near you.

SYNTRON

SYNTRON COMPANY

300 Lexington Avenue • Homer City, Pa.

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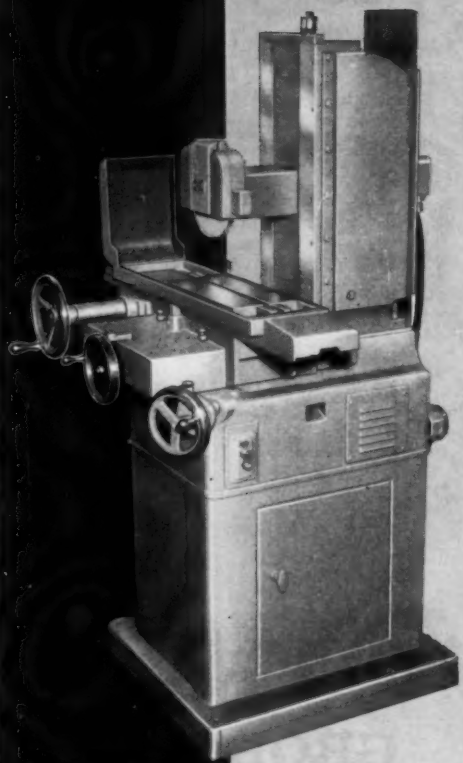
NEW DIRECT DRIVE

COVEL NO. 7A

Low-Cost No. 7A—the machine that gives you big machine features and performance—now offers **direct motor driven spindle** to give you even greater value. No.7A features include timing-belt table drive which eliminates operator fatigue; hard chrome tableways; hardened and ground lead screws; elevating hand wheel located below table level; ¾ HP direct drive spindle or ½ HP belt drive spindle. Price of belt drive machine is only $1250.00. Compare Covel 7A with costlier machines—it's another example of how Covel quality makes your machine dollars go further.

6" x 12" HAND FEED SURFACE GRINDER



Micro-Precision

COVEL

BENTON HARBOR, MICHIGAN

a Covel Tradition — —

PRECISION GRINDERS

Since 1874

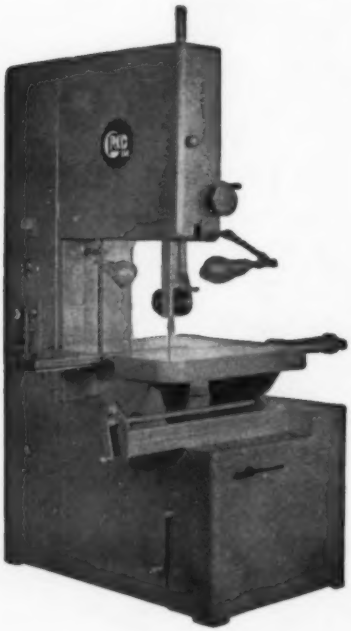
Write, wire or call TODAY for complete information on the 7A and the complete line of Covel Precision Grinders. Ask for Bulletin BB-71.

Use postpaid card. Circle No. 253

GROB SPELLS THE DIFFERENCE IN BAND SAW MACHINES

The new GROB 24" universal band saw
has all the famous GROB features:

Quality • Efficiency • Durability • Strength
Utility • Low Maintenance • Reasonable Cost



- Speeds infinite from 35-12000 FPM covers both cold and hot sawing
- Variable drive 3-speed transmission with precision rolled gears and splines transmits 15 HP
- Hydraulic table feed

See the difference demonstrated in our dealers' showrooms

or

Write GROB INC. for complete specifications

GROB also manufactures a complete line of:

BUTT WELDERS
FILING MACHINES
GEAR ROLLING MACHINES

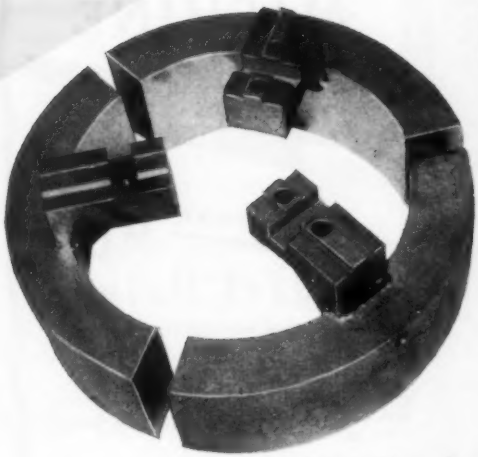
GRAFTON, WISCONSIN

Use postpaid card. Circle No. 254

SPECIALS
made
to your
SPECIFICATIONS

SOFT BLANK TOP JAWS
for all chucks
Made to AMERICAN Standards

immediate
delivery
on
STANDARDS



Soft Blank Top Jaws may be used on any chuck having master jaws. Both medium and heavy duty styles are carried in stock and made from 1020 steel.

BIG SAVINGS

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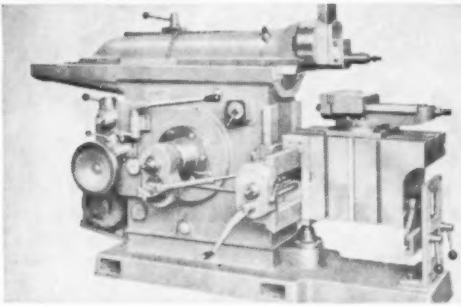

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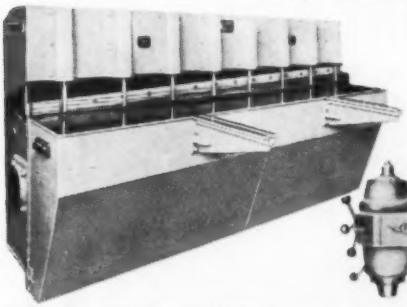
SHAPER Model 625
FORCED FEED LUBRICATION
SWIVELING TABLE

Stroke of ram	19 11/16"
Cross adjustment of table	25 5/16"
Vertical adjustment of table	14 1/4"
Surface of table	19" x 14 1/4"
Number of strokes per minute	20-45-85-110
Motor power	2 H.P.



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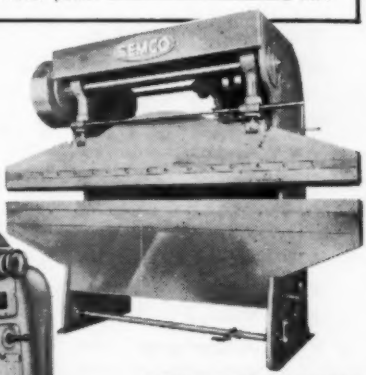

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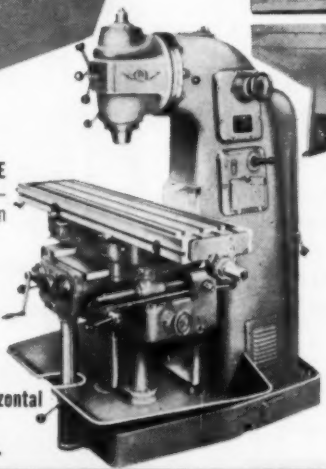

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- **NEW** Larger Chip Capacity
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- **NEW** Double Coolant Seal on Spindles
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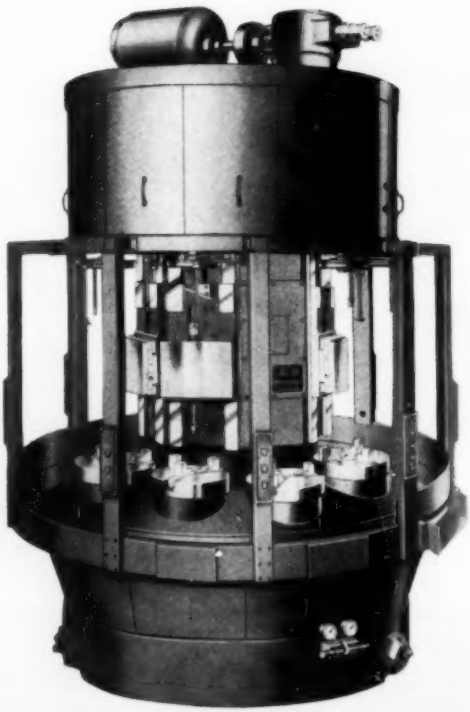
- **NEW** Adjustable Power Chucking
- **NEW** Lubrication Filter System
- **NEW** Standard Tooling
- All Bearings and Gears are pressure lubricated
- Easy to Service and Maintain
- Minimum Floor Space
- Versatility For Quick Set Up
- Uses American Standard Chucks
- Maximum Efficiency



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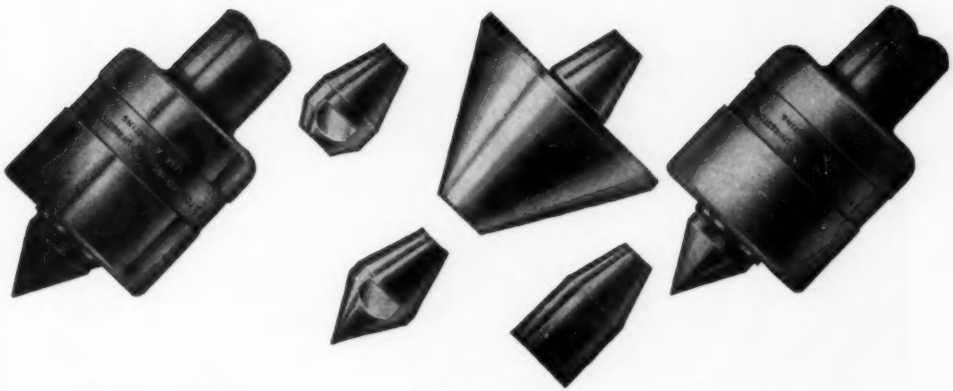

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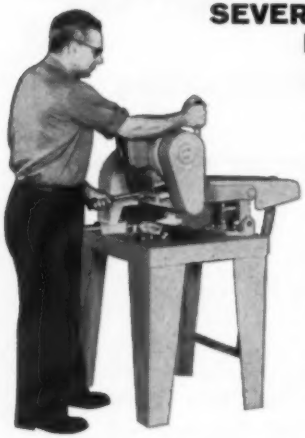

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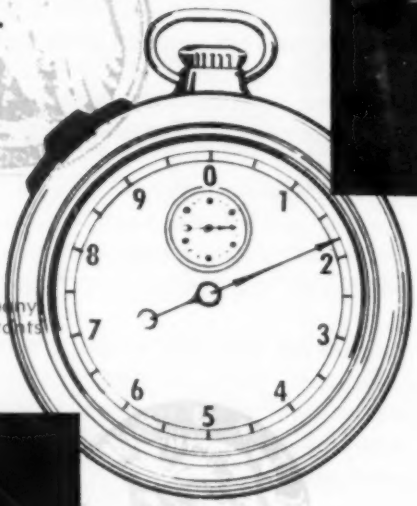
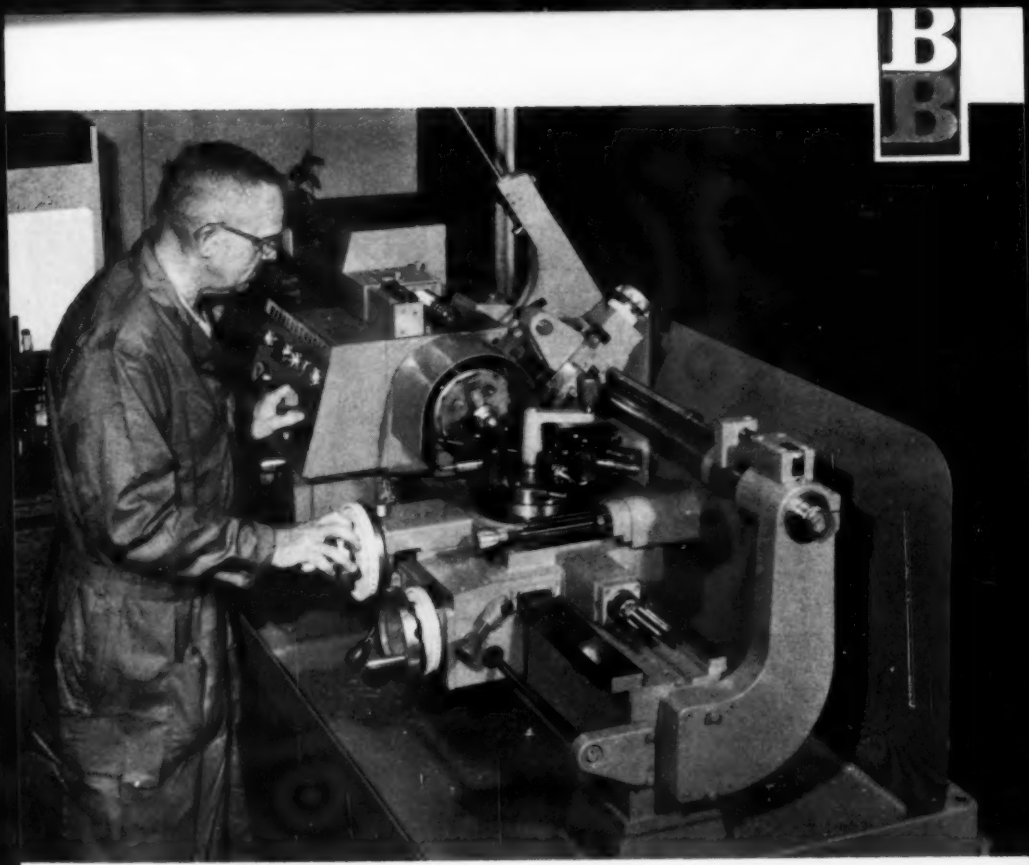
STANDARD TIME DATA

. . . for "guess-less" estimating.



By **E. A. Cyrol**
E. A. Cyrol & Company
Management Consultants



■ Each new recession in the business cycle further proves that inefficiencies still exist in our manufacturing plants. When the profit squeeze gets tighter, further improvements in product design or in manufacturing methods are usually found. In our work as management consultants, we know from experience that a plant that is not using properly engineered work standards has labor costs that are at least 25% too high, and in many instances as high as 100% too high.

It is not uncommon for a person responsible for machine shop operations to challenge this remark with, "Well, I can see when people are working, that they are running the machines—they can't be just 50% efficient!" Well, it isn't difficult to find plants that look busy but still are producing at only 50%.

Using properly engineered work standards, incidentally, you are asking the workers to do profitable work during their eight-hour shift, and you do this by weeding out the wasted motions—the "looking" for tools—the trying of wrong set-ups.

Potential for improvement is large

Only 25% to 30% of the manhours in machine shop areas are

5 STEPS in Establishing Standard Time Data:

TIME STUDY THE OPERATION with several operators over several days. Record all the work elements carefully, noting especially the break points. Time each element to a hundreth of a minute.

presently based on standard time data; the rest of industry uses old-fashioned rate setting methods typified by their interest in, "How many pieces do we get an hour?"

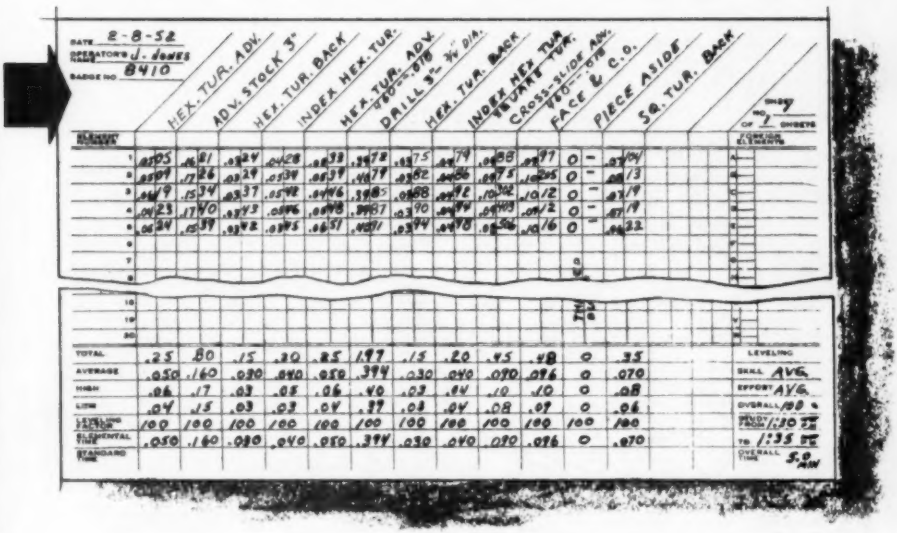
It is quite obvious that there is a need for a real, systematic approach to cost reduction in machining areas through properly engineered work standards. Since the foundation of a cost reduction program is, first of all, a good basic work measurement technique, the standard data approach is the most practical for metalworking manufacturing.

What is Standard Time Data?

Simply stated, standard time data is a family of time values for the elements that make up an operation. Standard data analyzes the time values; time study records them. Put another way, rate settings are to standard data as mechanics are to engineering. Time studies are mechanical while standard data are creative operations.

Any work cycle that consists of elements that can be observed, described, timed and averaged can benefit from work standards. The time values are determined from time study observations of the common elements of an operation. The common elements of any turret lathe operation, for instance, would be "load piece in chuck—unload—index turret—etc."

The only sure way to establish standards for specific operations is to conduct quite a number, 75 to 100 as a rule, of time study observations of the operations that might be on milling machines, drill presses or turret lathes. If you were performing this many time studies, you would end up with 75 to 100 standards. Because standard data can be used over and over for various operations per-



formed on one type of machine tool, you would end up with perhaps 2000 or more rate standards from 75 to 100 time studies.

Why Standard Time Data?

Many wonder, if both time studies and standard time data are used to determine how long it takes to perform an operation, why bother with the more complicated job of collecting standard time data?

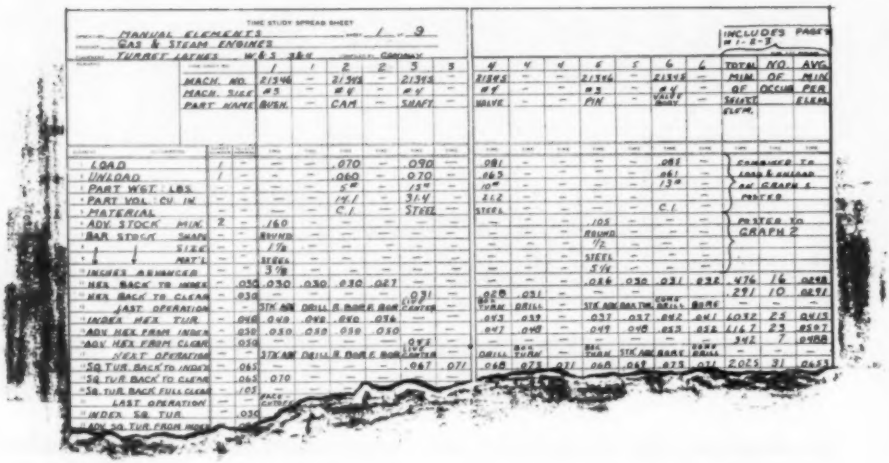
Using the data involves analyzing elemental time values and assembling them in the most effective pattern. Practically all of the guess is taken out of estimating. Thus, time values are established that are applicable for many different jobs. Work standards established by individual time study of each job are a waste of time! Besides, they cost too much.

Useful in selecting equipment

Suppose you are considering an improvement of one kind or another. It might be a new cutting tool, holding device, machine tool accessory, or something. Now, this improvement is going to cost you money. Suppose you are comparing a holding fixture, that uses wing nuts to hold the part down, to a hydraulic or air actuated clamping device. You would make a comparison, as to time, of the loading and unloading operation. After you have made the comparison and you have the data, you can go through all of your files and extend the production that would be applicable in this reduction to get the number of dollars per year that could be realized by the purchase of this equipment. This is a reference file that time study does not have!

One of the facts about standard time data development is that the average industrial engineer is unwilling to

2 **POST THE TIME STUDY DATA to comparison sheets where it can be easily analyzed. In this form, work elements that are constant and those that vary can be easily spotted.**



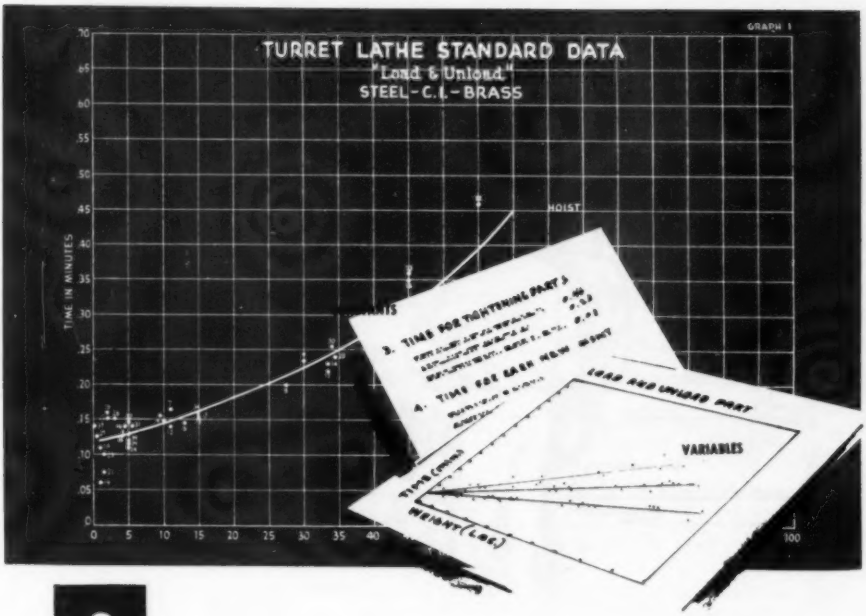
accept, at face value, that the time studies that he has in his files at the present time are probably completely useless as raw material for standard data! Many cost reduction programs may have been discarded before fruition because of this unfortunate fact. Time studies that are not taken according to a very clearly defined elemental breakdown pattern are useless for standard data because like elements cannot be compared to like elements.

One great problem in industrial plants is how to correctly reflect method improvements in new work standards! With standard data, the elements changed can have their time values easily up-dated. One of the main difficulties arising when changing standards after methods are changed is that the elements are not described in sufficient detail and the time values are not pinned down to the conditions sufficiently enough to permit continued improvements or continued revision.

The elements are described in a write-up. This seems to take a lot of time, but the development and the definition of standard data should be looked at the same way one looks at tooling up a job; a good, thorough job pays off many times over the long haul.

Five steps to standard data

When it is decided that time studies will be taken with the intention of



3 **ANALYZE THE DATA** to determine constant and variable elements. Chart the variables. At this point, look for possible methods improvements. Incorporate improvements in the standard work cycle.

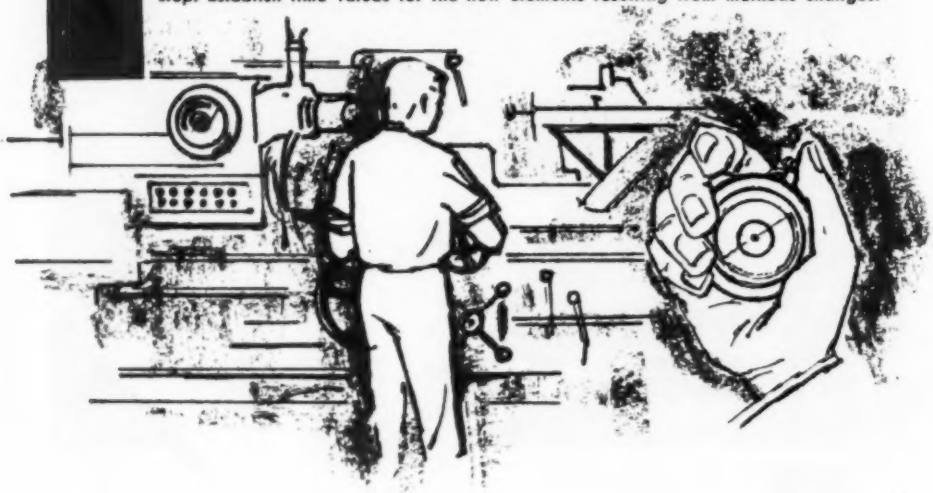
using them in the determination of standard data, a few exploratory time studies must be taken of the operations for which the data are to be developed. These studies will permit the creation of a pattern that must then be followed. This pattern describes the element and indicates the point at which the stop watch must be read.

It is important that the watch must be read at precisely the same break point for each element; if this is not done, all succeeding steps will be useless.

After several time studies have been correctly taken, they are posted on sheets that are usually referred to as comparison sheets, spread sheets, or analysis sheets, so the information can be easily analyzed. Operational and set-up time values are similarly posted. About twenty-five studies should be posted before any attempt is made at analysis of the constants and variables, which can be easily spotted on the comparison sheets.

The data collected must then be analyzed. Variables are charted. At this point look for possible improvements in methods and incorporate them in the standard work cycle. It is possible to realign elements to be able to assess the improvements on the work sheet. Standard data permits learning the best method possible by profiting from good element performance in many studies.

PREFORM A CHECK STUDY to determine the validity of values found in previous step. Establish time values for the new elements resulting from methods changes.



Testing the time data to determine the validity of the values is of utmost importance before preparing the standard data worksheet. If shortcomings show up, the data should be revised and improved at this time. For, a flaw ignored here will come up again and again to plague the man responsible for production standards.

It's good to take test studies of operations which weren't studied during the development of the original data, as well as the operations that were studied. Usually about ten studies taken according to the original elemental breakdown will test the standard data. Of course, these studies should be taken of large parts and small parts; operations having many and just a few elements should also be included. This is important so that the entire range of data is proven ahead of its "bath of fire" when it is released to the shop as production standards.

Finally, the standard data worksheet is designed. The layout is not important; but, it should be conducive to rapid calculation of the production standard. One such worksheet is used for each production standard calculated, and it is the record of the record of the standard determination. In writing up the study in permanent form include the detailed elemental descriptions, tables of time values, etc.

How to use the worksheet

A production standard is calculated in this article to serve as a guide to the prescribed method of determining a production standard.

The use of properly developed standard time data eliminates the need for individual time studies of the operations that are to be placed on

TURRET LATHE STANDARD DATA SHEET

Part Name ____________________ Part No. ____________

Operation ____________________ Oper. No. ____________

Dept. No. ____________

E. M. Q. ____________

Machine Name ____________________ Mach. Nos. ____________

TABLE 1 — MANUAL UNLOAD AND LOAD

WGT.	MIN.	WGT.	MIN.	WGT.	MIN.
1	.12	11	.15	25	.20
2	.12	12	.15	30	.23
3	.13	13	.16	35	.25
4	.13	14	.16	40	.28
5	.13	15	.16	45	.31
6	.13	16	.17	50	.35
7	.14	17	.17	55	.40
8	.14	18	.17	60	.45
9	.14	19	.18	Hoist	1.60
10	.15	20	.18		

TABLE 2 — CLAMP IN FIXTURES

	1	2	3	4
Set Screws	.40	.70	1.00	1.30
Slotted Clamps	.25	.44	.63	.82
If Remove Nuts Add	.20	.35	.50	.65
Bar Clamp	.60	1.10	1.50	1.90
Bar Clamp For Piston Rods Over 1½"	1.50	2.90	4.30	5.70

TABLE 3 — GAUGING

ALLOWED PER DIM.	
Micr. O. D.	.21
Micr. I. D.	.27
Depth Micr.	.35
Check Length	.16
Thread Gauge	.30
Plug Gauge	.15
Profile Gauge	.15
Thrd. Micro	.51
Valve Seat Gauge	.50

ADDITIONAL ELEMENTS

NO.	DESCRIPTION	MINUTES
	TOTAL	

DOWN TIME ALLOWANCE

TYPE OF ALLOWANCE	MINUTES
Personal	
Unavoidable Delay	
Tool Care	
Rgh.	
Fin.	
TOTAL DELAY	
PER CENT	

Previous Rate ____________ Previous Setup ____________

REMARKS

CALCULATION OF RATE

TOTAL ACTUAL TIME PER PIECE

Plus ____ % Allowance

Total Production Time

Plus ____ Incentive Adj.

STANDARD MIN. PER PIECE

STANDARD HRS. PER PIECE

SETUP TIME HRS. ________

Computed by ____________ Checked by ____________ Tool Equip. Record by ____________

Date of Study ____________ Approved by ____________ Date Posted ____________

SETUP CHART

DATE

Part Name ____________ Part No. ____________

Operation ____________ Operation No. ____________

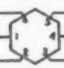
Dept. ____________

Mat. ____________

Machine ____________ Code No. ____________

Allowed Setup Time ____________ Run Time Per Pc. ____________

1	4
2	3



TURRET	DESCRIPTION	R.P.M.	SUR. FT.	FEED PER REV.

HANDLING ELEMENTS

Unload and Load from Table No. ____ Wgt. ____ Lbs.

Tighten and Loosen in Fixture from Table No. ____

Gauging from Table No. 3 ____ Allowed Per ____ Pcs.

Loosen and Tighten Chuck	3 & 4	1 A	J & L	4 A	Gisholt
Snug	.15	.15	.15	.45	.45
Average	.25	.35	.35	.75	.75
Heavy	.35	.70	.70	1.00	1.00

Loosen and Retighten Chuck Jaws .25 Min.

Blow or Brush out Chips .13 Min.

Change Tool in Slip Chuck .15 Min.

Change Tool in Taper Holder .34 Min.

Oil - Tap - Plug - Bar or Reamer .10 Min.

File Burrs or Break Corners No. x .12 Min.

True-up by Sight .50 Min. Indicator 1.00 Min.

TOTAL ADDITIONAL ELEMENTS

W&S 3&4	.06	.10	.19	.12	.12	.16	.10	.06	.08
W&S 1A	.07	.10	.25	.22	.14	.20	.16	.08	.08
J&L 8A	.07	.10	.21	.20	.12	.16	.18	.08	.08
W&S 4A	.10	.20	.34	.30	.17	.25	.22	.12	.10
Gisholt	.10	.20	.40	.35	.25	.30	.27	.12	.12

Column headings (vertical): Minutes Per Inch; Length of Cut; Cutting Time; ...; Ind. Chas.; Change Turret Station (90, 90, INDX); Reset Cross Slide; Clear and Advance (90, INDX); Start Slide ...; Set Adj. Stud; Total Handling Allowed Over Cutting Time

TOTAL

WRITE UP THE STUDY in permanent form, including detailed element descriptions, tables of time values, etc. Prepare standard data worksheets for finding total time for an operation.

5. LOOSEN and RETIGHTEN CHUCK JAWS

When a part is apt to be sprung in average or heavy chucking, the chuck is loosened and retightened lightly before the finish cuts are taken. This applies to parts with thin flanges or hubs that have close tolerances that may be outside allowable limits if the part is sprung.

6. BLOW OUT CHIPS

This element occurs in loading fixtures, soft jaws, and in checking diameters or blind holes. The time allowed covers the time required to pick up an air hose or brush, to clean the chips from the fixture or piece, and to replace the air hose or brush in its original position.

7. CHANGE TOOL IN A SLIP CHUCK

This element includes the time required by the operator to remove a tool from the slip chuck, to dispose of the tool, to select a new tool, and to place the new tool into the slip chuck in preparation for the next operation.

8. CHANGE TOOL IN A TAPER HOLDER

This element includes the time required by the operator to remove a tool from a taper tool holder, to dispose of the tool, to select a new tool, and to place the new tool into the taper tool holder in preparation for the next operation.

An example of this would be changing a drill in a sleeve.

9. OIL—TAP-PLUG-BAR-REAMER

This element covers the time required to apply oil with a brush to a tap, to a plug, to a steady rest bar, or to a reamer.

10. FILE BURRS OR BREAK CORNERS

This element covers the time required to pick up a file, or scraper, to file burrs or break corners, and to replace the file or scraper to an out-of-the-way position. This time value is per corner.

11. TRUE-UP

This element includes the time required by the operator to true-up the piece in the machine before finish tightening of the chuck. The element was found to vary according to the method used, i. e., true-up by sight, or true-up by dial indicator. The time values shown for each method are selected averages of the leveled observed occurrences. In the case of the dial indicator method, this includes also besides the actual true-up element, the setting up and removing of the dial indicator plus cleaning a spot to place the indicator fixture.

MACHINE MANIPULATION

Machine manipulation times were found to be proportional to the size of the machine. For convenience in applying standard data, the

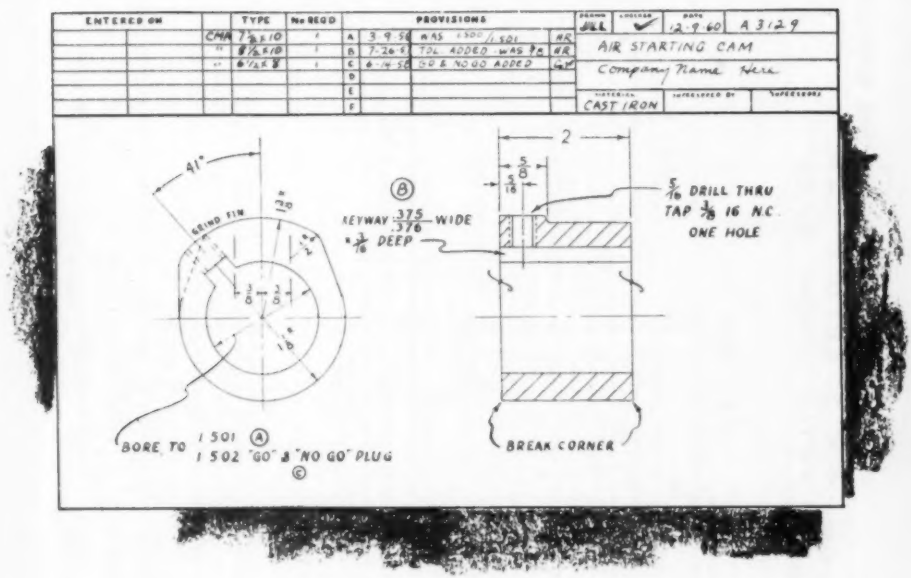
standard. Therefore, the standard data worksheets must be very carefully filled out with all the pertinent information regarding the operation. Should a grievance arise concerning a production standard, the worksheet and all its information, including descriptions and calculations, will be the basis of any investigation of the standard.

In the example, where gaging is required and gaging can be performed during a machine element, it is so designated on the worksheet.

If two simultaneous cuts are possible in an operation, the time allowed is the time for the longer cut.

When additional elements not included in the worksheet are found to be necessary, refer to the additional elements described in the write-up. If the desired element is included in this group, enter it on the worksheet in the "Additional Elements" box. If such an element cannot be found, a time study will be necessary to obtain this information. This new additional element should be recorded in the write-up for future reference and development of standard data for this element.

STANDARD TIME DATA EXAMPLE



This is a sample part for which a production standard is to be determined through standard data.

TURRET LATHE STANDARD DATA SHEET

Part Name AIR STARTING CAM — Part No. T-7772
Operation DRILL - FACE BORE — Oper. No. 10
Dept. No. 40
E. M. Q. 150
Machine Name J&L BA — Mach. Nos. 21611-21612

TABLE 1 MANUAL UNLOAD AND LOAD

WGT.	MIN.	WGT.	MIN.	WGT.	MIN.
1	.12	11	.15	25	.20
2	.12	12	.15	30	.23
3	.13	13	.16	35	.25
4	.13	14	.16	40	.28
5	.13	15	.16	45	.31
6	.13	16	.17	50	.35
7	.14	17	.17	55	.40
8	.14	18	.17	60	.45
9	.14	19	.18	Hoist	1.60
10	.15	20	.18		

TABLE 2 CLAMP IN FIXTURES

	1	2	3	4
Set Screws	.40	.70	1.00	1.30
Slotted Clamps	.25	.44	.63	.82
If Remove Nuts Add	.20	.35	.50	.65
Bar Clamp	.60	1.10	1.60	1.90
Bar Clamp For Piston Rods Over 1"	1.50	2.90	4.30	5.70

TABLE 3 GAUGING

ALLOWED PER DIM.	
Micr. O. D.	.21
Micr. I. D.	.23
Depth Micr.	.25
Check Length	.18
Thread Gauge	.30
Plug Gauge	.15
Profile Gauge	.15
Thrd. Micro.	.51
Valve Seat Gauge	.27

ADDITIONAL ELEMENTS

NO.	DESCRIPTION	MINUTES
	NONE	
	TOTAL	X

DOWN TIME ALLOWANCE

TYPE OF ALLOWANCE	MINUTES
Personal	20
Unavoidable Delay	15
Tool Care	
Rgh.	20
Fin.	
TOTAL DELAY	55
PER CENT	13.0%

Previous Rate .15 — Previous Setup .5

REMARKS: NONE

CALCULATION OF RATE

TOTAL ACTUAL TIME PER PIECE	3.35
Plus 13.0 % Allowance	.44
Total Production Time	3.79
Plus 20% Incentive Adj.	.76
STANDARD MIN. PER PIECE	4.55
STANDARD HRS. PER PIECE	.076
SETUP TIME HRS. 0.85	

Computed by W.K.C. — Checked by E.A.C. — Tool Equip. Record by W.K.C.
Date of Study 2-14-59 — Approved by E.A.C. — Date Posted 2-14-59

The front side of a Standard Data Sheet for turret lathes. On this side the part and operation are described; some of the manual elements are listed; allowance figures shown; and the standard data is calculated.

STANDARD TIME DATA EXAMPLE continued

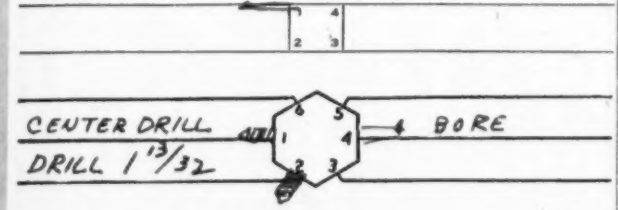
The back side of a Standard Data Sheet for turret lathes. On this side the setup is shown; the cutting elements are listed and detailed; machine times are calculated; machine handling times are listed; and cutting and machine times are summarized.

SETUP CHART

DATE

Part Name	CAM	Part No.	1-7772
Operation	DRILL - FACE & FINISH BORE	Operation No.	10
		Dept.	40
		Mat.	C.I.
Machine	J&L 8A	Code No.	A-B
Allowed Setup Time	0.85 HRS.	Run Time Per Pc.	.076

FACE



TURRET	DESCRIPTION	R.P.M.	SUR. FT	FEED PER REV
HEX 1	CENTER DRILL	340	—	H.F.
HEX 2	DRILL 1 13/32	243	90	.011
SQ 1	FACE END	340	235	.011
HEX 4	BORE 1.501 / 1.502	489	193	.011

HANDLING ELEMENTS

Unload and Load from Table No.			Wgt.	3	Lbs.		13
Tighten and Loosen in Fixture from Table No.							
Gauging from Table No. 3			Allowed Per	1	Pcs.		27
Loosen and Tighten Chuck	3 & 4	1 A	J & L	4 A	Gisholt		
Snug	.15	.15	.15	.45	.45		
Average	.25	.35	.35	.75	.75		35
Heavy	.35	.70	.70	1.40	1.40		
Loosen and Retighten Chuck Jaws				.25	Min.		
Blow or Brush out Chips				.15	Min.		
Change Tool in Slip Chuck				✓.15	Min.		15
Change Tool in Taper Holder				.34	Min.		
Oil - Tap - Plug - Bar or Reamer				.10	Min.		
File Burrs or Break Corners DURING BORE (1)				No. x .12	Min.		12
True-up by Sight		.50 Min.		Indicator 1.00	Min.		

GAUGE DURING DRILL HOLE TIME

TOTAL ADDITIONAL ELEMENTS

W&S 3&4	.06	.10	.19	.12	.12	.16	.10	.06	.08
W&S 1A	.07	.10	.25	.22	.14	.20	.16	.08	.08
J&L 8A ✱	.07	.10	.21	.20	.12	.16	.18	.08	.08
W&S 4A	.08	.20	.34	.30	.17	.25	.22	.12	.10
Gisholt	.10	.20	.40	.35	.25	.30	.27	.12	.12

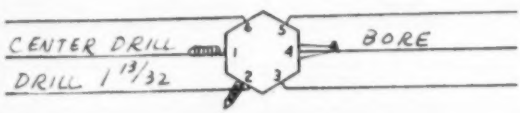
Minutes Per Inch	Length of Cut	Cutting Time	Change Speed or Feed	Ful Clear SQ.	Change Turret Station SQ.	Change Turret Station HEX	Reset Same Station	Clear and Advance SQ.	Clear and Advance HEX	Blind Hole Rap & ect.	Set Adj. Hand	Total Handling Allowed Over Cutting Time	
.42	3/8	.16	.07	—	—	.20	—	—	—	—	—	.27	43
.37	2 3/8	.89	.07	—	—	.20	—	—	—	—	—	.27	116
.27	3/4	.20	.03	—	—	—	—	.16	—	—	—	.23	73
.19	2 1/4	.43	.07	—	—	.20	—	—	—	—	—	.27	70
											TOTAL		335

SETUP CHART

DATE

Part Name CAM
Part No. T-7772
Operation DRILL - FACE & FINISH BORE
Operation No. 10
Dept. 40
Mat. C.I.
Machine J&L BA
Code No. A-B
Allowed Setup Time 0.85 HRS.
Run Time Per Pc. .076 HRS.

FACE



TURRET	DESCRIPTION	R.P.M	SUR FT.	FEED PER REV
HEX 1	CENTER DRILL	340	–	H.F.
HEX 2	DRILL 1 13/32	243	90	.011
SQ 1	FACE END	340	235	.011
HEX 4	BORE 1.501 TO 1.502	489	193	.011

TOOL SETUP CARD

Part Name AIR STARTING CAM Part No. T-7772

Operation No. 10 Description DRILL-FACE-BORE

Jig or Fixture Code No. / Name of Fixture 2-JAW CHUCK

TYPE OF TOOL	SIZE	CODE NO.
Drills	(1) CENTER DRILL	H.S.S.
	(1) 1 13/32" DRILL	H.S.S.
Reamers		
Taps		
Spot Facers		
Boring Tools	(1) BORE BAR + TOOL	CARB.
Turning or Facings Tools	(1) FACE TOOL	CARB.
Special Tools		

Remarks: SPECIAL JAWS #61330 & 2-JAW CHUCK

Front side of a setup and tool card (lower diagram) is a carbon of the left back side of the Standard Data Sheet. Sent to the job with the tools, it tells the machine setup by giving tool positions, and speeds, feeds, number, and sequence of the cuts. Back side of the card (upper diagram) identifies the part and operation, and lists the required tools. With this card, the crib attendant prepares the tools and fixtures in a kit and sends them to the job with the card.

TURRET LATHE STANDARD DATA
SET-UP STANDARD

THE FOLLOWING ELEMENTS ARE USED FOR DETERMINING THE SET-UP FOR ALL MACHINES:

MACHINE NOS. 21611 - 21612

PART NO. T-7772 OPER. NO. 10

1. Punch in and out				3.00
2. Get Tools & Mics from Crib				3.50
3. Clean Machine				1.00
4. Get & Store Tools		per tool .70 X	4	2.80
5. FIXTURES	small hand lift		6.00	
	approximately (0-2 in. x 0-18 in.) hoist lift		12.00	
	approximately (2-4 in. x 15-30 in.) hoist lift		16.00	

		#4, 1A & J&L	#4A & Gisholt	
CHUCK on and off (assume 3-jaw always on mach.)		(9.00)	13.00	9.00
STD JAW change (assume Std jaws are always on chuck)		7.00	10.00	
SOFT JAW change		7.00	10.00	
FACEPLATE		20.00	xx xx	
6. Get Ring, Etc., to Bore Jaws		3.50	4.00	
BORE JAWS (Minutes per inch) 3.30		all machines		
FACE JAWS (Minutes per inch) 4.00		all machines		
7. Tools (Load to Machine & Sizing)				
DRILL		(3.00)	3.00	3.00
REAMER		4.50	4.50	
TAP		3.20	3.20	
LIVE CENTER - CENTER DRILL		(2.00)	2.50	2.00
FORM	first dimension	5.00	6.00	
	Sizing each added tool use	3.00	3.50	
BORE	Scale Dimension	4.00	5.00	
	Micrometer Dimension	(5.00)	6.00	5.00
	Sizing each added scale Dimension	2.00	2.50	
	Sizing each added micrometer Dimension	3.00	3.50	
BEVEL	Scale Dimension	2.50	3.50	
	Micrometer Dimension	3.50	4.50	
	Sizing each added scale Dimension	1.50	2.00	
	Sizing each added micrometer Dimension	2.50	3.00	
TURN	Scale Dimension	4.50	5.00	
	Micrometer Dimension	6.00	6.50	
	Sizing each added scale Dimension	2.50	3.00	
	Sizing each added micrometer Dimension	4.00	4.50	
			SUB TOTAL	29.30

This is the front side of a typical Turret Lathe Standard Data Setup sheet.

			SUB TOTAL:	29.30
FACE	Scale Dimension	(3.50)	4.00	3.50
	Micrometer Dimension	5.00	6.00	
	Sizing each added scale Dimension	2.00	2.00	
	Sizing each added micrometer Dimension	3.50	4.00	
DIEHEAD (Includes setting of stop)		11.00	11.00	
ANY TOOL USING A BAR BEVEL HEAD	add.	2.00	2.00	
8. Set Stops	1 LONG Square Turret each	(1.40)	1.60	1.40
	1 CROSS Square Turret each	(.30)	.30	.30
	HEX Turret each	(1.70)	2.00	1.70
	Screw Type Stop on Chuck Face each	5.00	5.00	
	Ordinary Chuck Stop each	1.00	1.00	
9. Line up a bar with pilot hole			1.30	
10. Water connection on and off (steel jobs only)			4.00	
11. Get and assemble inside micrometers or depth gauge			.90	
12. Get and assemble indicator gauge	To Hex/Ways.		4.20	
	To Square Turret		2.60	
	Indicate O.D.		2.50	
	Indicate I.D.		4.00	
	Indicate Face		2.00	
13. Inspection				
Travel time-punch card-check parallel, square, or concentricity			(2.00)	2.00
	Check O.D. .50 X			
	Check I.D. .80 X 1			.80
	Check Length .40 X 1			.40
	Check Depth .40 X			
Check face and bore with arbor			5.00	
			TOTAL	39.40
20 Min. Personal, 15 Min. Normal Delay Allowance 7.9%				3.11
			TOTAL PRODUCTION TIME	42.51
			Plus 20% Incentive Adjustment	8.50
(MINUTES) TOTAL INCENTIVE SET-UP STANDARD				51.01
(HOURS) TOTAL INCENTIVE SET-UP STANDARD				0.85

COMPUTED BY W.K.C.

DATE 2-14-59

This is the back side of a typical Turret Lathe Standard Data Setup sheet showing the calculations for the setup standard.

How to Fasten
Carbide to Steel

Part 1: Carbide Grade Selection

By **Grant A. Morrison**
Manager, Application Engineering
Metallurgical Products Department
General Electric Company

■ Unfamiliarity with the different means of fastening carbide to steel and other materials discourages many from adopting carbide as a cutting tool, wear part, or even as a component part. If there is excessive downtime from carbide breakage, it is probably the result of faulty mounting and not the carbide. In those cases where carbide should be used but is not because of repeated failure of fastening methods, the real loss to that company is in lower production and in higher tooling costs.

There are four basic methods of fastening carbide—mechanical attachment, cementing, brazing, and shrinking or pressing. This series of articles will review each of these methods in order to aid the engineer or designer to better utilize carbide and to take advantage of its many desirable physical, metallurgical and chemical properties.

Quite often there is an interplay among the factors being considered so that the choice of grade, design of the part, and the size of the carbide section selected will be influenced. As for grade of carbide, the decision must be made with due regard to its properties. These properties, and their influence on design and application, are reviewed here to form a sound

basis for the future discussions on fastening methods.

Straight Tungsten Carbide Grades

These are grades which are composed of hard tungsten carbide with cobalt binder. The most important differences among the various straight WC grades are the relative binder content and microstructure.

Carbides with high cobalt content are tougher than those with low content, and are not as hard. With 3% cobalt, the carbide is very hard—too brittle for many uses. With 25% cobalt, its wear resistance level begins to approach that of hardened steel. Carbides with higher cobalt have higher transverse rupture strength.

Another factor which affects hardness and transverse rupture strength is grain size. As grain size decreases, hardness increases, but transverse rupture strength is decreased.

Straight carbide grades for various uses are established by balancing these factors. More than half the carbides made today are straight grades. They are used in cutting tools for machining brass, bronze, aluminum, in rock drilling and as materials for wear surfaces and other components.

Steel Cutting Carbide Grades

These contain, in addition to tungsten carbide, a proportion of titanium carbide and, in some cases, tantalum carbide. They were created to decrease or eliminate the cratering effect which make the straight grades unsuitable for steel cutting.

Toughness, wear resistance, hot hardness, resistance to deformation under load also are influenced by addition of titanium and/or tantalum carbide.

GENERAL PROPERTIES

Hardness

Various grades of cemented carbides provide a considerable range of hardness, which extends far above that of the hardest steel.

High Temperature Hardness

This is a most important characteristic of carbides. They retain hardness at temperatures above 1000° F. At 1400° many grades are harder than tool steel at room temperature. When returned to room temperature original hardness is restored. Hardness is not the result of heat treat, it is "built-in". This is an important property as most metal working operations, particularly

Characteristics of Straight Grades

1. As grain size decreases, hardness increases.
2. Decreasing cobalt increases hardness.
3. The higher the hardness, the greater the abrasive wear resistance.
4. Decreasing cobalt content decreases toughness.
5. Finer grain size decreases toughness.

cutting, generate considerable heat.

Compressive Strength

This is high—higher than most metal alloys. Carbides will absorb, with a minimum of deformation, higher compressive loads than any other material. This makes it suitable for heading hammers and dies, cold extrusion and metal flattening.

Young's Modulus of Elasticity

This is very high. Cemented carbides have a modulus 2½ to 3½ times that of steel. This makes it useful where high resistance to deflection is needed—high pressure cylinder liners, boring bars, extrusion punches, grinding quills, etc.

Transverse Rupture Strength

While this is by no means low, it is not so high as compressive or tensile strength—varies with different grades. Best design calls for avoiding extremes of transverse rupture strains.

Tensile Strength

Again this is lower than compressive strength.

Thermal Expansion

This is roughly half that of steel. The precise coefficient of expansion will vary somewhat in different carbide grades.

The designer must recognize this factor. For example, when brazing segments of carbide to steel there are limits to the length and area of carbide which can be attached successfully. If it is too long, greater contraction of the steel in cooling can break the bond. In a shrink type assembly to be operated at higher temperatures, increased interference must be allowed to compensate for the differences in expansion of steel and the carbide. Otherwise the steel may expand enough to allow the carbide insert to loosen or fall out.

Low coefficient of expansion is a distinct advantage in metal forming dies. Metal forming dies heat up in operation. Carbide dies expand less than those of steel; therefore, they maintain closer part tolerance.

Thermal Conductivity

In most grades of carbide this is higher than that of steel—may be three times as high. This enables carbide to disperse heat faster. Punches and dies can be expected to operate at lower temperature rise than those of steel.

Density

This is relatively high—higher in straight grades.

Wear Resistance

This is extremely high. Carbides may outwear conventional alloys 50:1.

Corrosion Resistance

The carbide crystal in pure form is almost inert to corrosion. Binder content may reduce corrosion resistance, but it is always very high. Certain grades have exceptional resistance to chemical corrosion.

FUNCTION DETERMINES DESIGN

Carbide size, shape and geometry are determined by the function of the tool, die, or structural part. A good design is one which will do the job effectively and economically. One of the decisions which the tool designer must make is the method of attachment or fastening of the carbide.

Details of these methods will be reviewed in subsequent months. Next month, the subject will be on attaching carbides mechanically. • • •

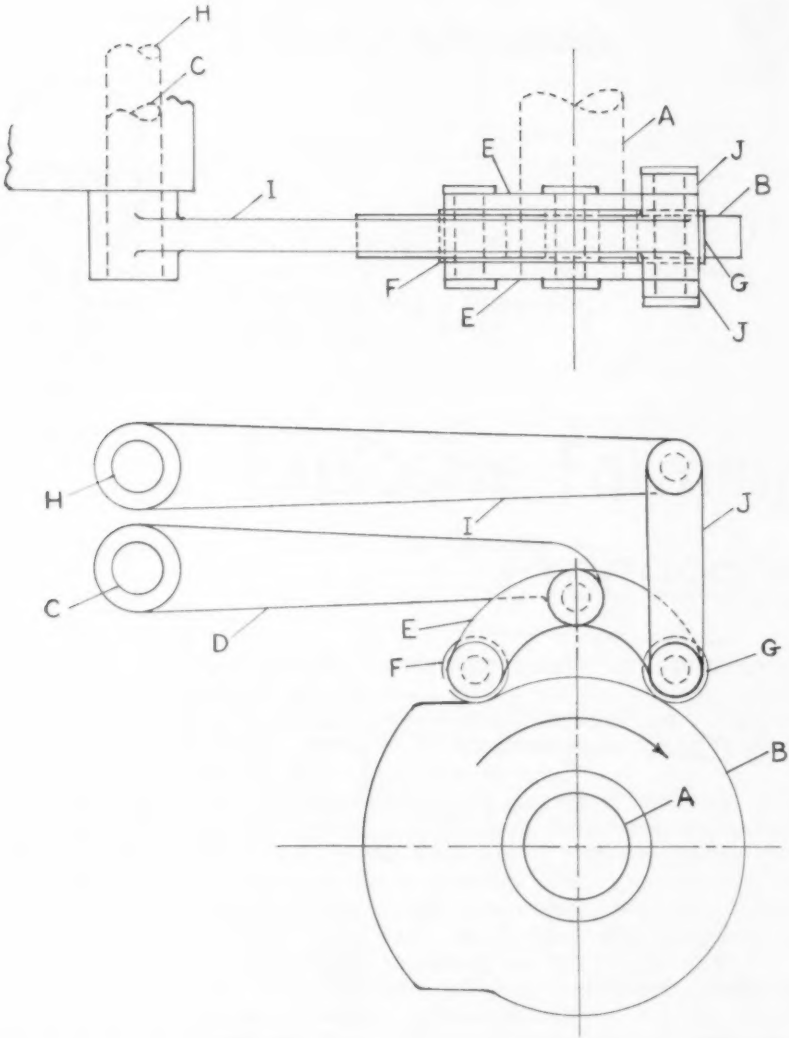
Cam Operates Two Levers– In Different Sequences

By **L. Kasper**

■ The drawings illustrate the design and operation of a cam lever mechanism which operates two levers in different sequences. The cam operates two levers which transmit oscillating motion to two shafts which operate two slides on a wire fabricating machine.

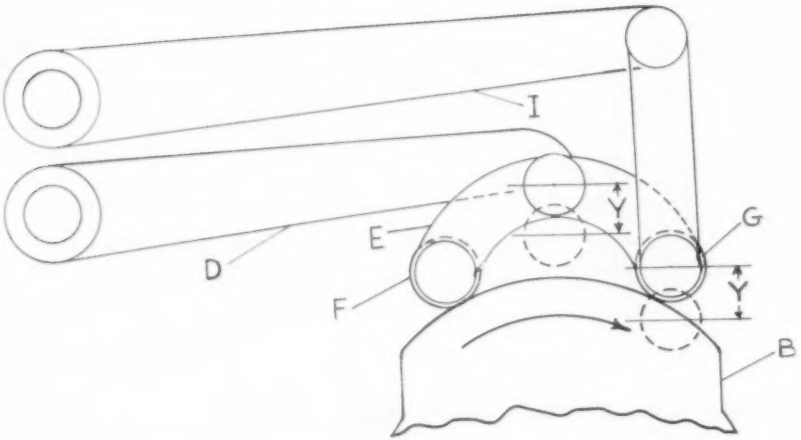
The drive shaft **A** carries the cam **B** rotating in the direction indicated by the arrow. Shaft **C** carries the lever **D**, which carries on its free end the two swivel links **E**, between which the rollers **F** and **G** are mounted and contact the cam **B**. Shaft **H** carries the lever **I**, the outer end of which carries the two links **J** which are connected to the ends of swivel links **E**. Levers **D** and **I** are spring-loaded to insure contact of the rollers **F** and **G** with the cam **B**. Fig. 1 shows the mechanism at the beginning of the cycle.

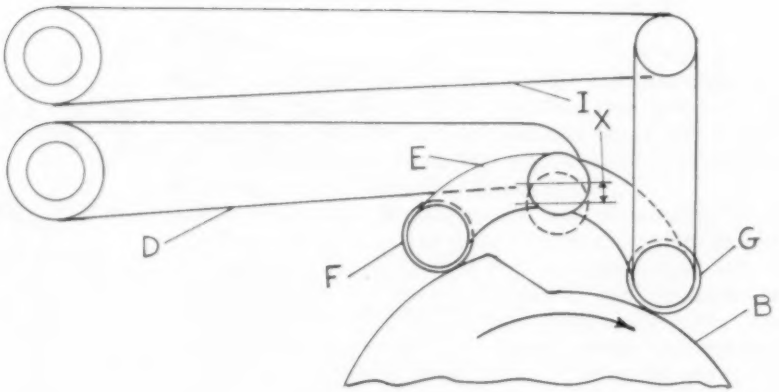
Figs. 2 and 3 illustrate the operation of the mechanism. Referring to Fig. 2, the cam **B** has rotated in the direction indicated, and the lobe of cam **B** has raised roller **F**, which causes the levers **E** to swivel on lever **D**. Roller **G**, remaining on the low rest-section of cam **B**, becomes the fulcrum of links **E**, and the end of lever **D** is raised in proportion to the lengths of the lever arms of links **E**. At this point, the end of lever **D** has been raised a distance approximately to one-half the rise of the cam **B**, as indi-



cated by **X.** Both levers now remain at rest until the lobe of cam **B** contacts roller **G.**

In Fig. 3, rotation in the direction indicated has brought the lobe of cam **B** into contact with roller **G,** causing it to be raised to the position shown, the roller **F** acting as the fulcrum during this movement. This causes the lever **I** to be raised a distance equal to the full rise of cam **B,** and lever **D** is again raised a distance equal ap-





MOTIONS continued

proximately to one-half the rise of cam **B.** At this point, both levers **D** and **I** have completed their upward movement equal to the rise of cam **B,** as indicated by **Y,** the movement of lever **I** being completed in one motion, whereas lever **D** has made two shorter movements with a rest period between.

As the rotation of cam **B** continues, roller **F** rides off the lobe of cam **B,** transmitting a short movement to lever **D,** and after a period of rest, roller **G** rides off the lobe of cam **B,** giving the full downward movement to lever **I,** and completing the downward movement of lever **D.** • • •

By **Charles H. Wick,** Vice-President
Dudgeon, Taylor & Bruske, Inc.
Detroit, Michigan

Explosive Forming Processes

■ A pneumatic-mechanical method of high-energy-rate forming was discussed in last month's column. Another important high-energy-rate method which has created considerable interest in the metalworking industry during the past few years is explosive forming.

Explosive forming is the shaping of materials by the suddenly-applied, short-duration shock-waves and gas pressures caused by the detonation of explosive charges or the burning of propellant powders. Many companies are now using the process—most on an experimental basis, but some in production—for forming, sizing, forging, extruding, compacting, welding, hardening, and other applications.

In contact forming, which is used less frequently, the explosive charge is placed in intimate contact with the workpiece. With such a setup, pressures of approximately 4,000,000 psi can be produced at the interface. Since such pressures are usually far more than can be used, most applications now place the explosive charge at some distance from the work, and employ a medium such as water to dampen and distribute the force. Since the pressure exerted on the work is inversely proportional to the so-called "standoff" distance, pressures from several thousand to

several hundred thousand psi can be obtained.

Many pressure transfer mediums have been tried, including air, oil, water, plastic, talcum, mercury, and sawdust. However, most companies using the process agree that water is the most satisfactory.

Explosive forming can be performed with totally-closed or open dies, or be of the free-forming type. Totally-closed dies, which are employed less frequently, make use of lower-pressure, deflagrating explosives such as black and smokeless powders, and are generally limited to the production of small parts from thin metals. In free-forming applications, deformation is not limited by a die, but by the properties of the metal being formed and the power of the explosive charge used.

1. A geyser of water rises during the explosive forming of the jet-engine tailpipe sections seen on the left. Two explosions form the part within a tolerance of .002". Flange edges have smooth finish, require no further machining.

Open-die applications of explosive forming, which are by far the most popular, make use of high-pressure, detonating explosives, and a pressure transfer medium such as water. Such setups generally consist of a tank of water in which the female die, material to be formed, and explosive charge are placed. Detonation of the explosive forces the material into conformance with the die, and raises a geyser of water from the open top of the tank, Fig. 1.

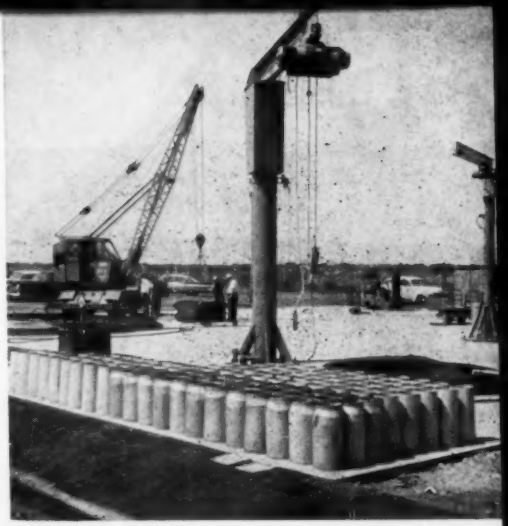
Dies for explosive forming have been made from many different materials, the choice generally depending on the number of parts to be produced. Good results have been obtained for short and medium runs with plaster and Kirksite dies. Longer life can usually be obtained with dies made from epoxy or steel-faced concrete, ductile iron, or steel. Lubricant is sometimes applied to the part or the die prior to forming to facilitate removal from the die. Also evacuation of air from between the material and die is generally necessary to prevent the air from being compressed and interfering with the forming and thus causing springback, or becoming heated sufficiently to burn the work.

Major advantages of explosive forming include the potential for pro-

ducing very large parts, the high pressures available, and its low cost. The size of parts that can be produced is limited only by the size of the sheet material available, the size of the die that can be made, and the ability to handle the work and die. The great pressures available make it possible to shape most difficult-to-form materials. However, the process is also being used to form softer and more ductile materials. Among the materials that have been formed in this way are aluminum, copper, nickel, tantalum, zirconium, columbium, and carbon and alloy steels. Also refractory, high-strength materials such as 17-7 stainless steel, Rene 41, 6-4 titanium, and Hastelloy X have been explosive formed.

Economy is a major advantage of explosive forming when only limited quantities of parts are required, or when large, complex shapes must be produced. The process can be performed at a fraction of normal tool costs, and without the need for large, expensive machines. For example, the Rocketdyne Division of North American Aviation has reported a cost saving of $500,000 in dies by explosive forming bulkhead stiffeners for the B-70 airplane.

Most applications of explosive forming have been in the aircraft and missile industries for producing parts such as missile tanks, motor cases, nose cones, radar housings, and thrust chambers. Fig. 1 shows an installation at Ryan Aeronautical Co., San Diego, Calif., for producing tailpipe sections for jet-engine, directional-thrust ball joints from L-605 cobalt-base, high temperature alloy, 0.063″ thick. Two explosive forming operations are performed on this 30″ diameter part, using a ductile-iron die. A tolerance of 0.002″ is maintained, and no subsequent machining is required. Parts seen in Fig. 2 are stainless steel, jet-engine tailpipes for the Ryan Q-2C Firebee target missile.



2. Explosive forming is being used for the quantity production of stainless steel, jet-engine tailpipes for the Ryan Q-2C Firebee target missile.

In spite of its many advantages for specific applications, it is obvious that explosive forming—at least in its present state—will never replace the traditional forming methods. The latter are generally faster, simpler, and cheaper for production requirements, at least for smaller parts. Loading and unloading slows the explosive forming process. Also, in most instances, it must be performed in remote areas because of the hazards involved. Before the art of explosive forming becomes a science, much more data must be compiled with respect to types of explosives, charge sizes, and stand-off distances in relation to different materials and part sizes. • • •

Use numerically controlled machines? . . .

Speed Machine Setup With One Reference Point

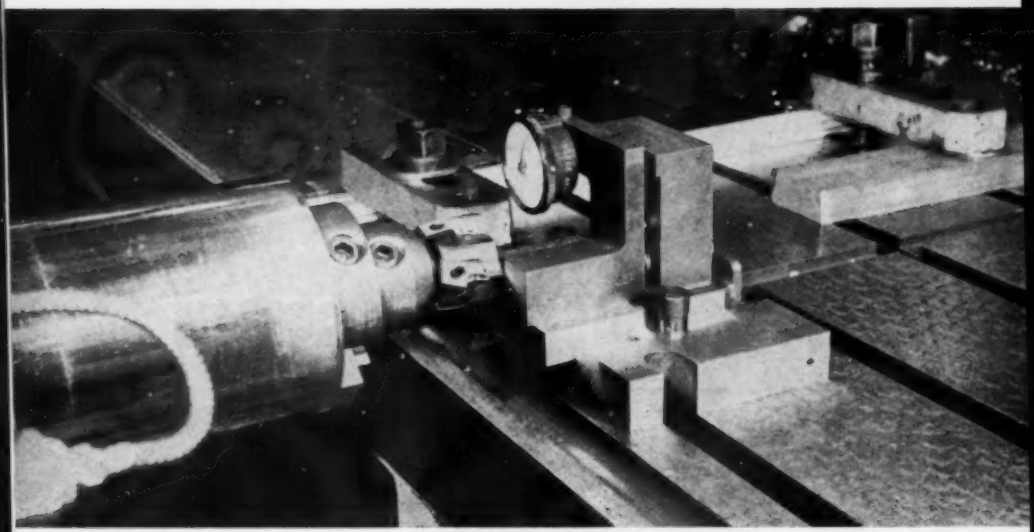
By: **Edmund G. Wright**
Tool Method Technician, Ordnance Department
General Electric Company, Pittsfield, Mass.

■ A reference block fixed to the work table of a numerically controlled horizontal boring mill improves accuracy and saves time in presetting the machine's cutting tool. The reference block, established in a known position on the work table, becomes the zero point. From this point, all tool operating positions are programmed on the punched tapes that control the machine.

Before the start of a machine cycle, the face of the cutting tool in the spindle is set against the block. The machine is then set in motion and the tape runs it through the cycle. Each time a different tool is installed, it is set against the block for the start of the new cycle.

Previously, it was common practice to establish a reference point right on the work fixture. This meant that for each different work-piece a new point had to be established. With the block system, programming for all work-pieces is calculated from the same reference point.

The reference block we use consists of two sliding members mounted on a base that is keyed to the work table. A dial indicator on the block is used to show when the

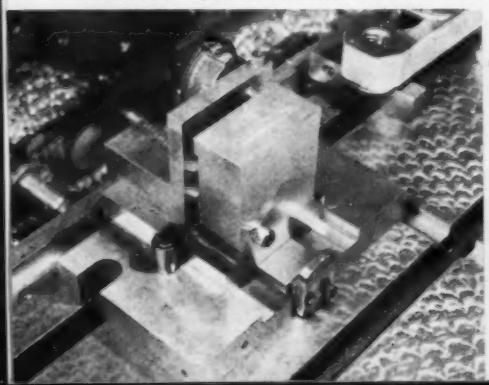


Presetting a cutter is easy with this zero point reference block. To preset this cutter, the machine's quill is advanced until the cutter pushes the block a preset distance that is read from the dial indicator.

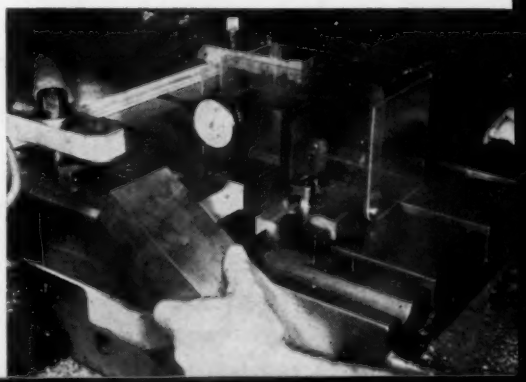
block is properly positioned at zero — a known dimension measured from the edge of the table. If it is found that the work-piece is off dimensionally, the sliding portion of the reference block is adjusted the amount required to bring the operation within tolerance.

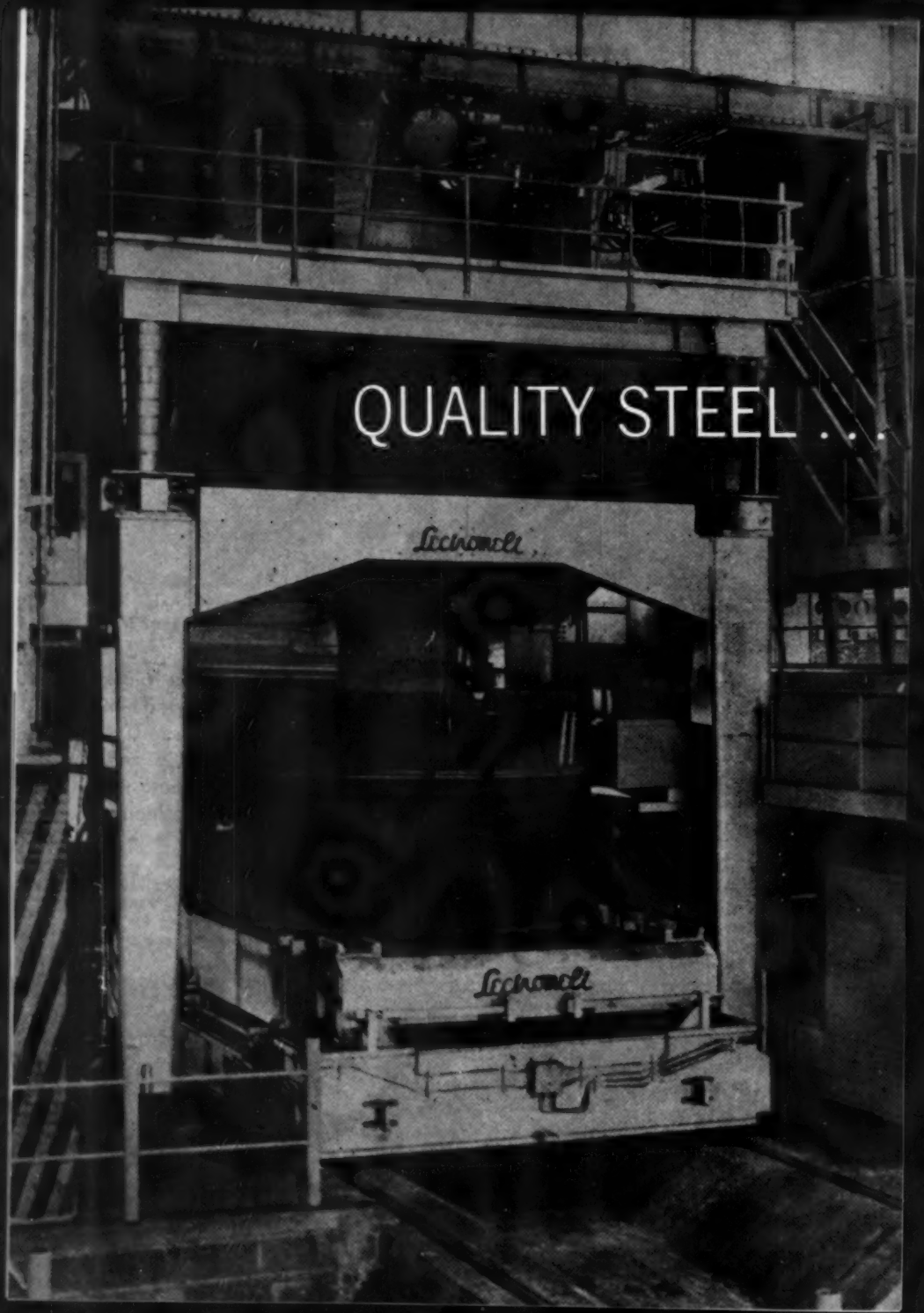
We feel that the reference block system is superior to the method of presetting with feeler gages. It is adaptable to most numerically controlled machines, especially those not equipped with lateral prepositioned tools. • • •

Rear view shows how two sliding members are mounted on a base that is keyed to the work-table. Small clamp on side of reference block secures the blocks for large distances necessitated by different tools.



Presetting the reference block is accomplished by means of a gage block and a straight edge. With this block system, programming for all workpieces is calculated from the same reference point.




QUALITY STEEL . . .
Lichnoll
Lichnoll

VACUUM DEGASSING: BB

. . . from the Open Hearth

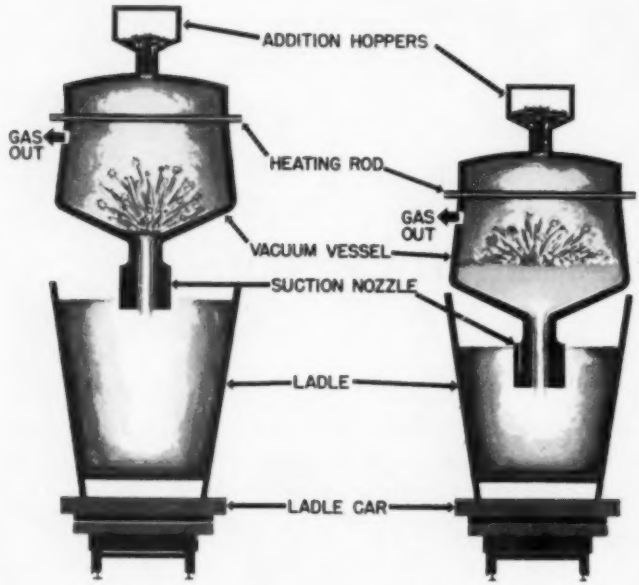
An up-and-down movement of a "snorkel" inside the ladle makes it practical to produce steel free of inclusions and voids in tonnage quantities

■ The first D-H (Dortmund-Horder) degassing unit in America makes it possible for air-melted steel to approach the quality of the vacuum-melted product . . . and to do so economically. Now operating at the Midland (Pa.) Works of the Crucible Steel Co. of America, the unit was built by the Lectromelt Division of McGraw-Edison.

The treatment consists of degassing a ladle of molten steel by repeated lowering and raising the level of a "snorkel" extending down from a vessel overhead. When the gases have been evacuated by the changing pressures in the vessel, necessary alloying elements are introduced. Twenty to forty cycles are involved, depending on the size of melt, and the entire process takes less than thirty minutes.

In the past, steel of uniform quality, free of nonmetallic inclusions and voids caused by the presence of gas, has had to be produced by vacuum-induction or vacuum-arc melting. These techniques reduce the oxygen level and therefore reduce the level of oxides as well as the gas content. The D-H treatment does much the same job, but at a cost which makes tonnage quantities of quality steel only slightly higher than the cost of the untreated product.

continued

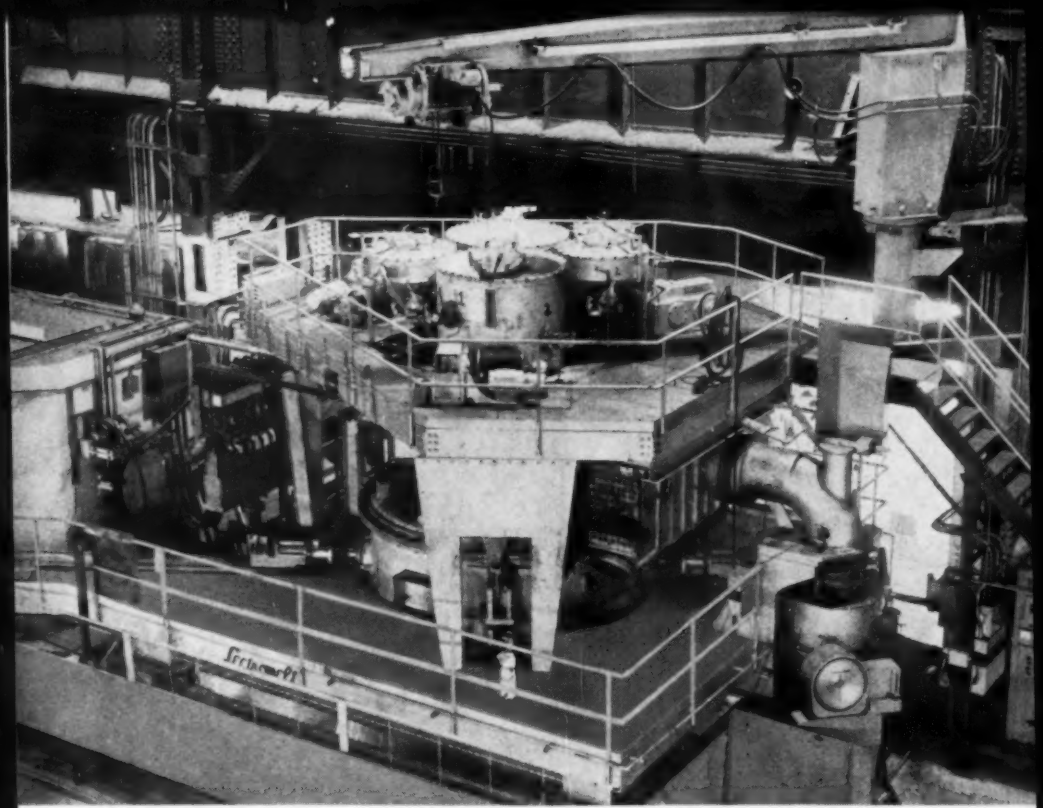


Positions of vessel, snorkel, and ladle shown diagrammatically at raised and lowered positions of D-H cycle.

The Procedure: An open hearth heat of steel is tapped from its parent furnace, flowing into a ladle which is filled to a predetermined level. The ladle, containing about 170 tons of molten steel, is carried by crane and placed in the cradle of a transfer car directly in front of the D-H unit. After the transfer car is weighed electronically, it is shunted beneath the snorkel and a quick determination of the slag depth is made. The treatment now begins.

The vessel is lowered until the snorkel penetrates the metal to a preset depth. During the up-and-down movement of the vessel, the open end of the snorkel never rises above the level of the melt. The vessel is supported by four piston-like legs, and is reciprocated hydraulically.

With the release of high-pressure steam through a five-stage ejector system, an abstractive force gradually pulls the atmosphere to 1/1000 normal pressure from the vessel. Resulting unbalance causes the molten steel to be pushed up the snorkel into the vessel, and it rises to a height of approximately 59″ above the metal line. Upper and lower limits are now set on the vessel movement.



Ladle on transfer car ready for treating. Snorkel has already entered melt. Deck above vessel supports vacuum-tight hoppers containing alloying elements.

With the weight of the supported column of metal remaining in balance with the force of normal air pressure, the column height will not change as the vessel reciprocates within the established range. On the up stroke, metal flows down the snorkel; on the down stroke, metal flows up.

During the action, the metal is in continuous motion. In a typical cycle, about one-tenth of the total weight of the metal in the ladle is treated and recirculated. For an effective treatment, thirty-two cycles are required before alloys are added—thus subjecting each unit of metal to the vacuum conditions three times.

Next, specified composition of the steel is obtained by releasing from vacuum-tight hoppers above the unit a predetermined amount of the proper alloying elements. Each alloy is added at a speed consistent with its solution rate. Final phase consists of six mixing cycles to promote homogeneity.

At the end of the treatment, the transfer car is shunted to the front of the D-H unit, and a crane lifts the ladle and carries it to a teeming area, where the heat of steel is cast into twenty-eight 12-ton ingots. • • •

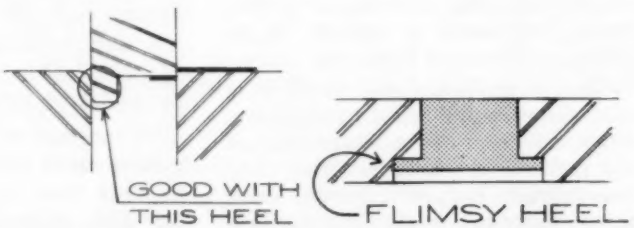
BB

THE PRACTICAL DIEMAKER

By **Paul Prikos**
Prikos & Becker Tool Co.
Skokie, Illinois

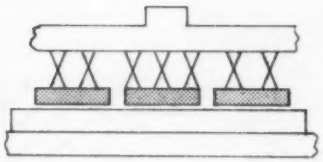
Tips on Tooling for Long-Run Production

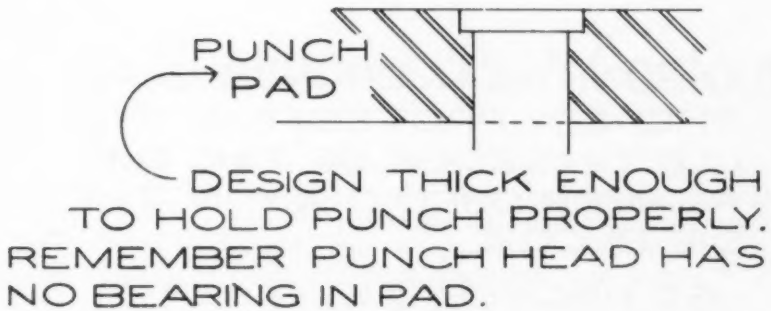
■ The tooling tips cited in this month's column are not new; they are common knowledge to most experienced diemakers. However, the fifteen points cited here are regularly recurring sources of trouble that limit die production runs. Because these troubles do persist, they are repeated here as a guide to the die supervisor, die designer and the diemaker. The more these trouble areas are imprinted in their minds the better the chances of obtaining smooth-running production runs. These areas are:



1. Notch punches not heeled. 2. Flimsy heels.

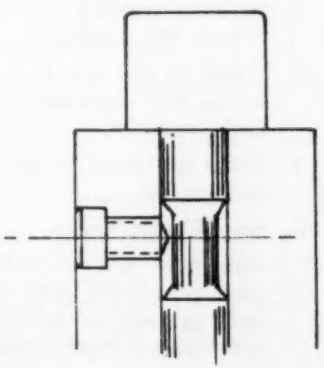
3. Break up the spring stripper where possible to allow ease of assembly. Maintenance and spring adjustment are especially important in draw dies.

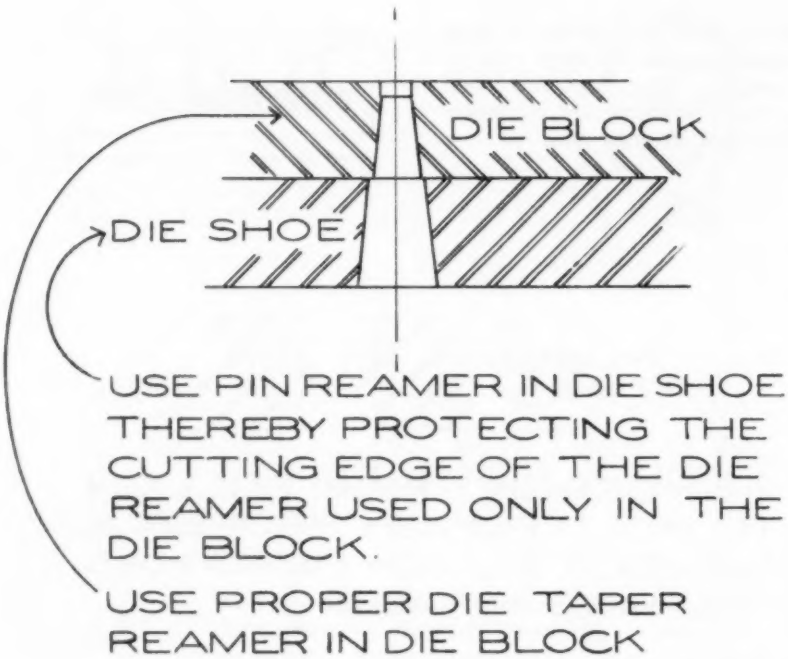




4. Punch pads not heavy enough.

5. Positive K.O.'s in dies should use a pin or cap to protect the heels of the shedder. The K.O. rod should have an undercut to prevent locking by the set screw.




DIE BLOCK
DIE SHOE
USE PIN REAMER IN DIE SHOE THEREBY PROTECTING THE CUTTING EDGE OF THE DIE REAMER USED ONLY IN THE DIE BLOCK.
USE PROPER DIE TAPER REAMER IN DIE BLOCK

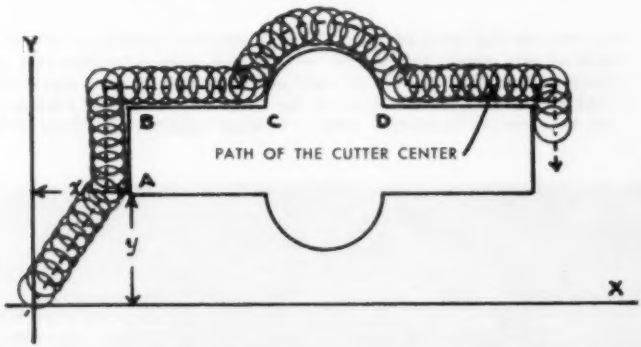
6. Proper taper in die block and die shoe.
7. Shedders without clearance provisions for doubling.
8. Grind all 127 H.C.H.C. sections due to soft outer skin caused by heat treatment.
9. Check die set for accuracy before building die.
10. Set all form angles.
11. Aluminum has a tendency to pack up cutting openings, especially perforators. Be certain die openings are highly polished.
12. Use precision die sets on cutting and important close fitting dies. Use commercial die sets on form dies.
13. Be certain all forward edges of the underneath side of stationary strippers are rounded off.
14. Provide adequate starting methods for strip such as finger stops or "French" stops.
15. On draw dies, always have the pressure extra heavy to prevent buckling.

By **James J. Childs**
Administrator, Machinery Modernization Programs
Republic Aviation Corp., Farmingdale, N.Y.

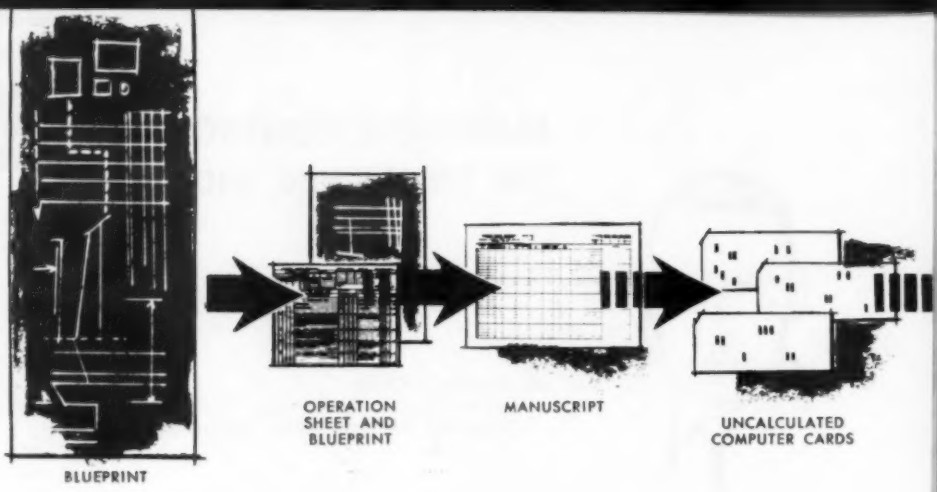
Continuous-Path Contouring

■ As mentioned previously in this series, there are two varieties of numerical control equipment: point-to-point (discrete) positioning, and continuous-path contouring. The point-to-point equipment is relatively simpler, both in design and input information requirements.

In programming or preparing information for continuous-path contouring such as required for a profile



1. Point A would be x inches from the Y axis and y inches from the X axis. If the cutting tool is to travel from point A to point B, coordinates of point B are described next. All intersection points (A, B, C, D) are described together with the proper speed of travel and the diameter of the cutter.

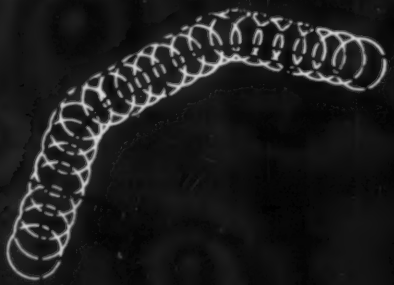


NUMERICAL CONTROL continued

milling machine, it is necessary to describe the entire path of the cutting tool within the specified tolerance. To keep the cutter on the prescribed route, thousands of points might be required.

While the most widespread application of continuous-path contouring has been in milling operations, the practice is also gaining a foothold in flame cutting, welding, turning, grinding, routing, drafting, loft template making, and other forms of manufacturing. Unlike discrete positioning, the path of the cutting tool is critical, since, as in profile milling, metal is being cut during the travel. Again, unlike the point-to-point concept, a computer has proven to be a definite requirement in order to realize the full benefit of

2. Arc divided into equal straightline chord segments to within specified tolerances. The cutting tool travels along the straight-line portion, generating a "curved" section. 4. A typical manuscript. Numerical data noted on this form is typed directly on cards which are then processed and calculated by the computer. "Sequence Number" specifies required points on the part in numerical order. "Contour Description" defines type of curve on part in

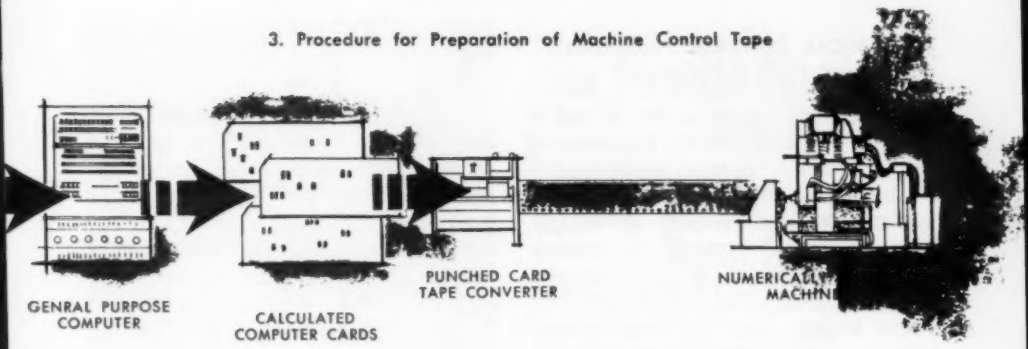


NUMERICAL CONTROL MANUSCRIPT

REPUBLIC AVIATION CORP. MFG. ENG. DIV.

SEQUENCE NO.	CONTOUR DESCRIPT.	SPECIAL INSTRUCT.	ENDING COORDINA	
			U	V

3. Procedure for Preparation of Machine Control Tape



continuous-path numerical control, particularly for cutting along three axes simultaneously.

As with any manufactured part, the original information source is the engineering blueprint. The part description shown on most blueprints is normally not suited for direct numerical control interpretation, so dimensional notations must be transformed into the format acceptable to the computer.

In order to establish the proper dimensional notations, the part is considered to be positioned in a quadrant of coordinates. (See Fig. 1). Points A, B, C, D, etc. are described as distances from the X and the Y axis. The description is continued until all points where direction changes are noted. The coordinate values for these points are then described on a form sheet commonly known as a manuscript. The manuscript describes

abbreviated form. The third major column describes any "Special Instruction" that might be required by the computer. "U" "V" and "W" describe X Y and Z coordinates of the point on the part in inches (to four decimal places). "Effective Radius" denotes cutter radius required for computer to calculate cutter center path. "Curve Tolerance" and "Feed Rate" describe the allowable chord tolerances and the linear travel rate of cutter.

C- C	TO REVISION	PREPARED	CHECKED	APPD	APPD
	SHEET OF				

W	EFFECTIVE RADIUS	CURVE TOL.	FEED RATE		REMARKS

the part with regard to the X and Y (and Z, if depth varies) positions of the directional change points.

Since most present continuous-path systems describe motions in straight lines, each curve must be broken down into a series of short straight-line segments. The segments, or chord lengths, must be short enough to allow the cutting tool to remain within the tolerance requirements. A curve described on a blueprint and the straight line cuts (exaggerated) that will approximate the curve appear in Fig. 2.

Thus far we have been considering the description of the part. However, since the electronic control unit must describe the path of the center of the cutter, the mathematical description of the part is not sufficient, and the instructions noted on the tape must describe the mathematics of the center path of the cutting tool. Considering the time required for calculating chord lengths and particularly cutter offset, it can readily be realized that some sort of automatic data processing technique is required.

The logical answer is the general-purpose computer. This device has proven extremely helpful in reducing tape preparation time in the numerical control field and might be considered as the most significant contribution to the economical operation of continuous-path machines. Unfortunately, the cost of operating the bigger electronic computers restricts their use to large corporations. But open time on the equipment is often being used to prepare tapes for small companies.

An alternative for the smaller company is to buy a smaller type general-purpose computer. These computers, while not possessing the exceptionally high speeds of their big brothers, are nevertheless capable of handling most numerical-control data economically and efficiently. Cost of these units ranges from $65,000 to $300,000.

The procedure for preparing a machine-control tape is described in Fig. 3. Operation sheets or schedules are obtained from the engineering blueprint in much the conventional manner. Consideration is given to mating surfaces, maximum feeds and speeds, and machining cuts most suitable for numerical control. (Often a part will have auxiliary machining operations prior or subsequent to the numerical-control machining.) The operation sheets and blueprints are then forwarded to the part programmer who is responsible for describing the part mathematically on the manuscript, Fig. 4.

Once the manuscript is completed, it is forwarded to the computing room where the uncalculated computer cards are typed. After computer processing a second calculated deck of cards is prepared. These cards then are inserted in a card-to-tape converter which automatically transfers the coded information on the cards to the required machine-control tape. The completed tape can then be inserted in the electronic control unit, located adjacent to the machine tool.

Further details describing advanced part programming and computer techniques, such at APT, are to be covered in future columns. • • •

Problem:

One Straight Cut... *One Miter Cut*

Solution:

One MARVEL No. 8 Band Saw

Recently, a MARVEL Field Engineer was called on to help solve a troublesome production sawing operation.

He found that a straight cut and a 45° miter cut were required on a 10" diameter pipe prior to welding it into an assembly. Production was slow, cutting costs were climbing to alarming proportions, and too many pieces were being rejected because one or both cuts were not meeting accuracy standards.

The trouble was easy to find. A makeshift arrangement was being used to do the job. After the straight cut was made, the miter was laid out and the pipe swung out into the aisle so that the saw could make the angle cut. Excessive work handling slowed production, valuable floor space was taken up, and accuracy became increasingly difficult to maintain.

Recommending a MARVEL No. 8 Universal Band Saw solved the problem. When the MARVEL Field Engineer showed how the Saw's column and blade can be tilted up to 45° right or left of vertical and fed straight into and through the cut at the pre-determined angle *while the work remained stationary on the table*, the production superintendent recognized the answer to his problem. He also saw, how the built-in protractor would eliminate all layout.

Result: another MARVEL No. 8 Universal Band Saw went to work for a new user.

Cutting miters quickly and accurately is just one of a hundred jobs that can be done on the versatile No. 8 Universal Band Saw . . . the most useful—and used—metal cutting saw on the market. Get complete information on this time and cost saving band saw today. Write for Catalog 875.

Marvel No. 8 Universal Metal Cutting Band Saw
Capacity: 18" x 18"

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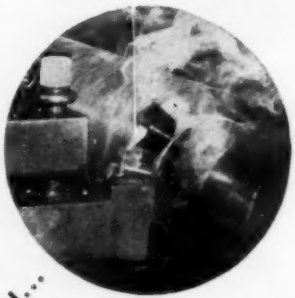

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By **Ray W. Ruckel**
Vice President
Wesson Corporation
Ferndale, Michigan

Applying the new Adjustable Cartridge Units

■ Except in cases where no known standard tooling exists to do a job, and specials must be used, the decision to go to specials is rarely clear cut. The problem isn't simplified any by the fact that progress is being made so rapidly in the design of special cutting tools.

In spite of the problems of knowing when to use specials, their use has multiplied considerably in recent years. Incongruous as it may seem, the steadily increasing use of special cutting tools has come about because of standardization programs. Prior to World War II, almost any carbide tool was a special. During the war, brazed-carbide tools were made in stock shapes and sizes but usually required special grinding.

Standard components first became normal practice with the introduction of on-end and throw-away insert type holders for turning and facing. The carbide slugs and inserts, and the holders in which they were used, had to have standard dimensions. This was so obvious that at first no one—user or producer—recognized just what it meant.

At about this time, users realized that the biggest production savings still to be realized would result from combining operations. The first efforts in this direction however,

proved disappointing. Production gains, in many cases, were offset by increased maintenance costs of the early brazed-type combination tools employed.

It is difficult and costly to maintain brazed-in cutting bits that have to be accurately ground with relation to the tool body and to each other. Mechanical insert holders, however, helped resolve this problem. Slugs—which can be ground and then simply adjusted for length—and throw-away inserts—which can be indexed and replaced easily—permit maintenance of a tool without destroying its accuracy.

However, because commercially ground throw-away inserts do have tolerances (sometimes with greater latitude than those for the super-accurate present-day workpiece) multiple-point throw-away combination tools had a slow start. People who used them were sold on their advantages but had also recognized their drawbacks.

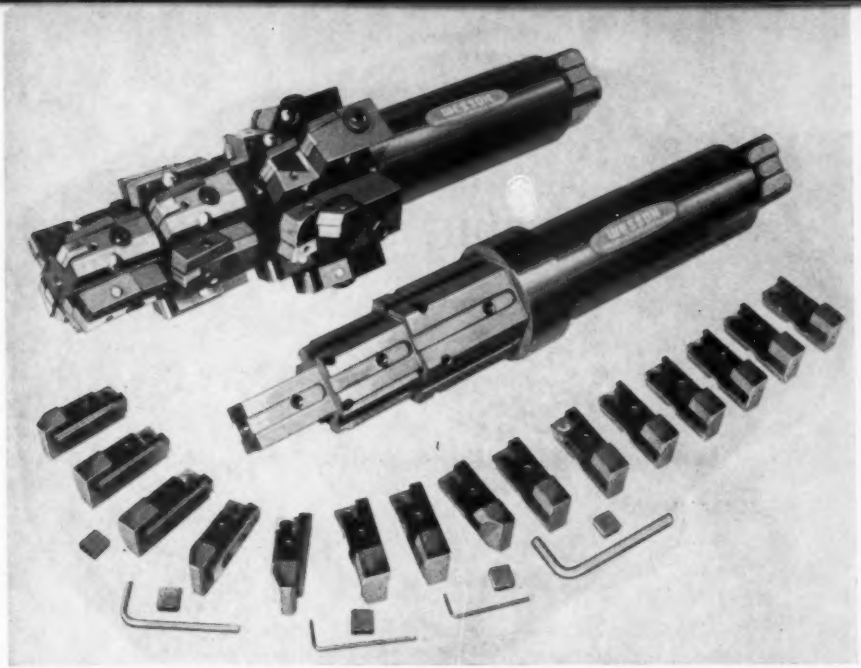
As interest in combination tools with throw-away inserts increased, it was seen that just a few types of components were required to make an infinite variety of tools. These tools could be for boring, milling, chamfering, turning and facing, or for any combination of such operations.

While early combination tools with throw-away inserts had been made from cut-down standard turning holders, special holders were developed when the components were standardized for multiple-point tools. The most important feature of these new "cartridge" units was their ability to be adjusted in two directions—axially and radially. With such cartridges, tolerances of throw-away inserts no longer limit the tolerances that can be attained consistently on the workpiece.

Now, the design of a special multiple-point cutting tool is a relatively simple matter. The workpiece and its tolerances set the requirements for the types of inserts, holders, clamps, anvils and adjustments needed. Relationships among the surfaces to be machined indicate the length and breadth of the tool. Then the standard components are drawn in and the special body required to hold the components where they belong is outlined.

When you plan the use of special cutting tools, the blueprint dimensions of the part are not the only consideration. You (and the person who will design the tool) should know the type of machine on which it will be mounted, and the condition of the machine should be determined. The horsepower available, and the speed and feed capabilities are important. The finished workpiece will be no more accurate than the combination of all the elements in its machining process.

Another important consideration is the method of holding the part. When using multiple-point tools, the workpiece is almost always held in a fixture. Fixtures for any machining operation should be designed with the configuration and strength of the part in mind. This is even more important when combination tools are



THIS SPECIAL QUILL is made up of a wide variety of cartridges. It is used to bore, face and chamfer power-steering housings in one pass. All cutting edges on the latest type cartridges are individually adjustable.

used because, if the part is overstressed in the fixture, the carefully interrelated dimensions produced by the tool will all be destroyed when the part is unclamped and stress is relieved.

If the workpiece is being processed on an automatic machine—where it will be completely machined before it is unclamped—fixture design is probably more important to end results than the design of any one cutting tool, even a multiple-point tool. In this situation, the possibility of stresses being introduced by machining operations, as well as those that can result from clamping pressures, must be anticipated. For extremely accurate work, it is sometimes necessary to unclamp the workpiece between roughing and finishing operations.

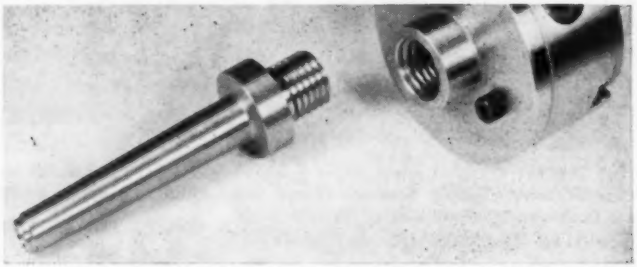
Complete planning for the use of special cutting tools should include some consideration of what will happen under adverse conditions. What will happen if the tool is presented to a workpiece that has excessive stock left on it? What will be the effect of encountering a part that is improperly located or clamped in the fixture?

Standard replaceable cartridge units have been designed so that, if a wreck does occur, they will protect the tool body from serious damage. Design of the tool body, however, should include thought of its protection during a smash-up. In automatic processing, a gaging station, before the special multiple-point tool, may provide the best answer for avoiding many adverse conditions while maintaining high product quality. • • •

BB Shop Hints

TOOL HOLDER USING CHUCK HAS BROAD RANGE

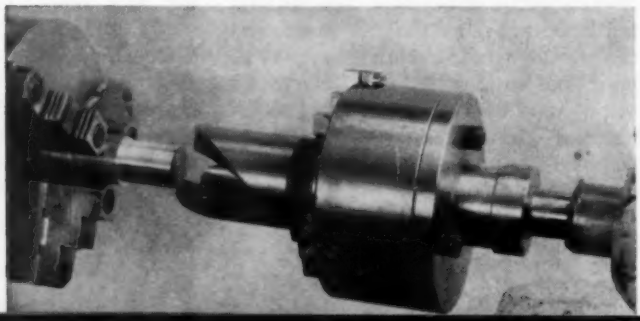
By **H. J. Gerber**



■ On many occasions we have found it necessary to hold various types of cutters that are too large for conventional drill chucks. By attaching a taper shank to a small universal lathe chuck we have mounted it in the tailstock of an engine lathe and are able to hold these larger tools.

As an example, a hollow mill is shown held in this chuck. The operation is to reduce the diameter of short brass studs. Without this chuck it would have been necessary to make a special adapter to hold the tool.

We have also found that the chuck is very useful for gripping hole saws and trepanning cutters of large diameters. • • •



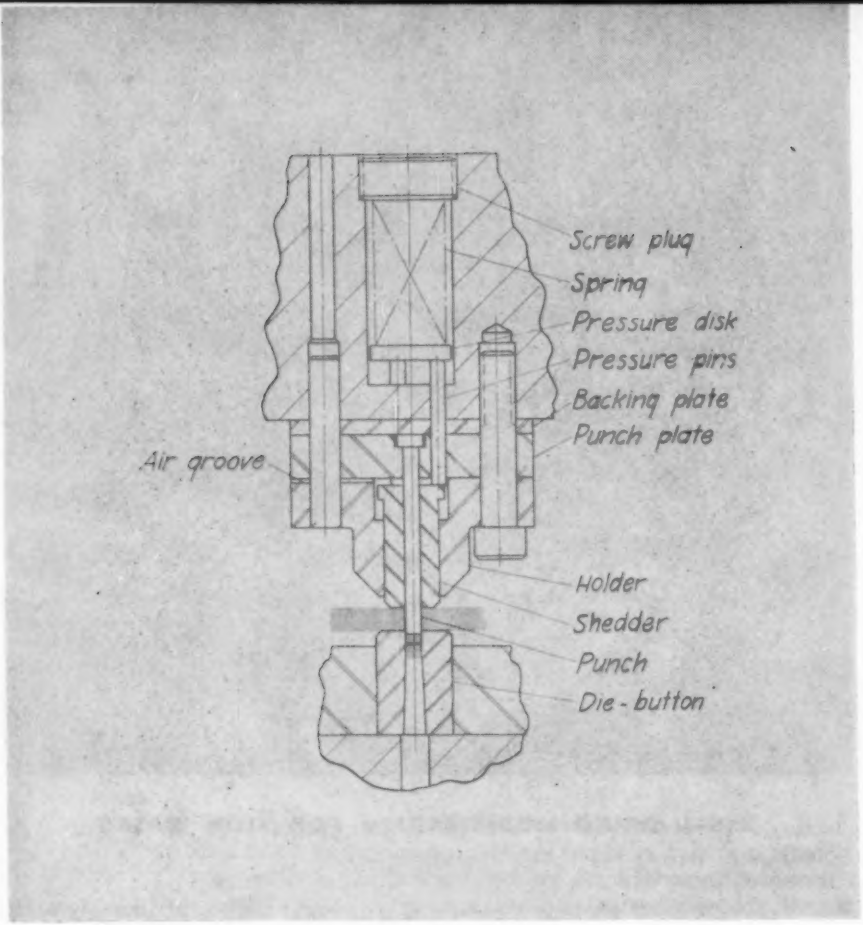
DRILL GRIND MODIFICATION FOR THIN WALLS

By **George J. Stevens**
Armco Steel Corporation

■ All grades of stainless steel are machinable when the correct tools and equipment are used. The "tricks of the trade" covering chip control, drilling, reaming, tapping, threading, forming and lubricants can be the key to faster, more efficient stainless machining operations.

One operation that causes trouble is drilling large holes in thin sheets or tubing, operations that leave burrs on the underside. Because of the danger to the operator if the drill jams, costly hold-down methods are required for his safety.

A radical change in the conventional drill point solves the problem. The point, shown at the right, is modified with a grind reminiscent of a wood bit. This type of trepanning cut will penetrate a thin wall or sheet without tearing the work or leaving burrs to be removed later. • • •



PIERCING HOLES IN THICK STOCK

By **M. W. Loftus**

■ Holes smaller in diameter than the thickness of the stock can be pierced at a savings over drilling when requirements are high. However, it often happens that trouble is encountered on piercing small diameter holes with breakage of the punches— generally due to improper design and construction of the die.

The die shown here is designed so that such breakage can be eliminated. It is made for piercing .160″ diameter holes in ¼″ thick cold-rolled steel parts of different sizes and shapes. The hole center tolerance of the parts is large enough so that the parts can be gaged from a side and end while piercing one hole at a time (gages not

shown). The same gaging points are used for each different hole set-up, which help in keeping the spacing within the required limits.

The punch is closely guided in the spring shedder and supported all the way to the end as it enters the stock. The stock is held by the shedder so that it will not move when the punch hits it. Three pins transmit pressure to the shedder. As the stripping pressure required in this case is quite high, a high-pressure type spring with a relatively small deflection is used. In order to keep the closed length of the spring constant, the shedder and punch have the same amount removed when sharpening the punch; and are flush when in the open position. The punch enters the die-button approximately .020″ at the bottom of the stroke, and should be accurately centered in the die-button. It is backed by a hardened plate made from flat ground stock. The die-button is a press fit in a soft die plate, and both it and the punch are made of high speed steel.

On dies where several holes have to be pierced at the same time and are too close together to use the construction shown, use a spring stripper guided on four posts and use shoulder bushings to support the punches at the end when they enter the stock.

For best results, the type of dies described should be mounted on four-post, precision die sets. • • •

PRESSURE SOLDERING IN A DRILL PRESS

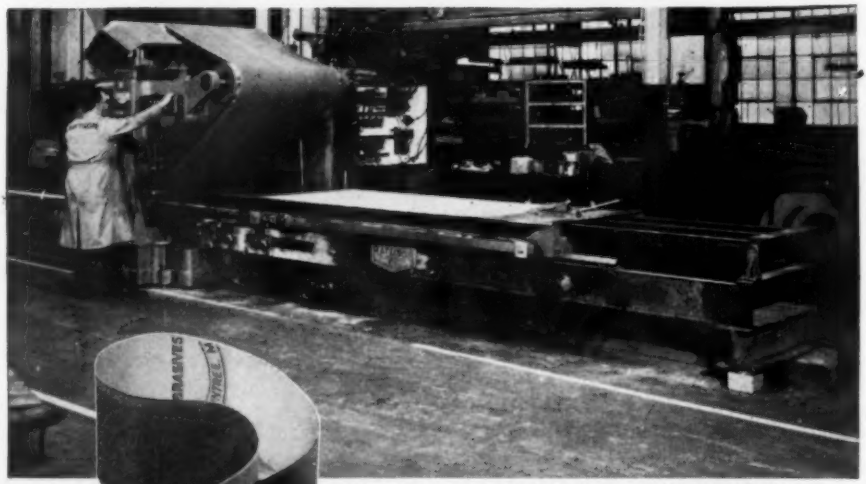
By **H. J. Gerber**

■ To facilitate "spot-soldering" a quantity of bi-metallic strips for a research project in our labs, I adapted an electric soldering iron to a drill press.

Somewhat in the nature of the spot welding process, spots of fluxed wire solder were first melted on the lower strip of the pair, the top strip placed in position, and the soldering iron brought down and held tightly for a few moments to sweat the work together.

The tip of the soldering iron has been filed flat to increase the contact area and to improve its heat transference. The work should be seated on some kind of insulating material, such as hard wood, to prevent undue heat loss. • • •

for a better finish and lower grinding cost, specify Jewel Brand abrasive belts



Courtesy of Mattison Machine Works, Rockford, Ill.

The Mattison No. 455 Wide-Belt Grinding and Polishing machine utilizes factory coated abrasive belts. It is designed to grind Stainless Steel and alloy sheets.

Today's modern machines are highly developed to produce at highest production speeds with uniform results and minimum costs. But one thing they can't do — they can't choose the right abrasive belt. That's why men who know metalworking specify Jewel Brand. They know, from experience, that Jewel Brand Abrasive Belts are built right to do the job — and do it well.

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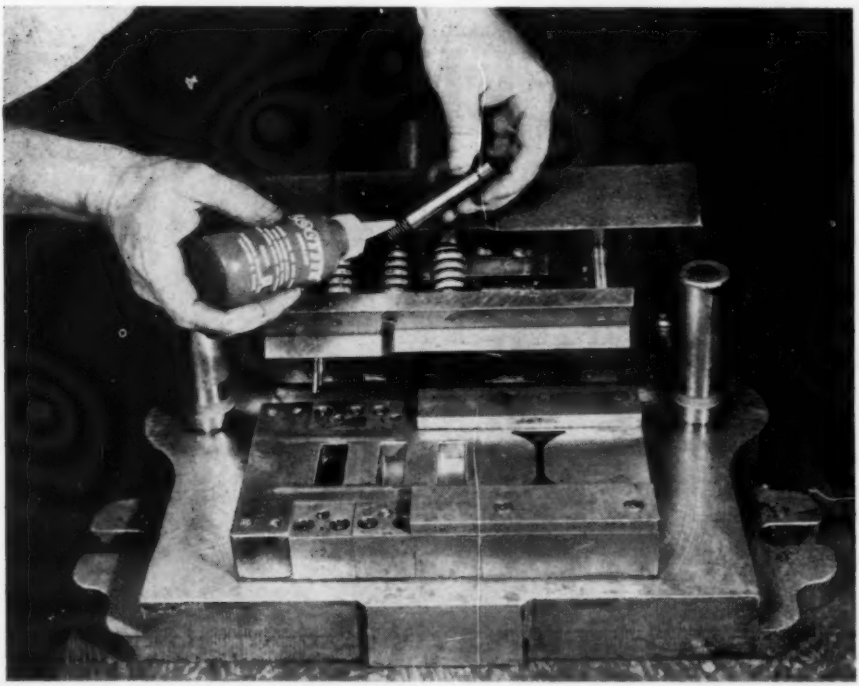
SEALANT KEEPS SCREWS SECURELY IN PLACE

■ The familiar problem of stripper bolts coming loose in press tools can be eliminated by the use of a liquid plastic that locks cap and shoulder screws in place, holding them secure against all shock and vibration. Use of the sealant method of locking screws allows the user to take full advantage of precision quality heat-treated shoulder screws. Called Loctite, the sealant is made by American Sealants Co., Hartford, Conn.

The method of application is simple. The parts are cleaned with any shop solvent and allowed to dry. Apply the sealant to either the male or female threads, putting on enough to wet the threads. Then assemble in the usual manner. The parts go together easily since the locking action develops after the parts are assembled. The sealant will harden in the clearance between the threads to lock all of the engaged threads and give positive resistance to loosening from vibration.

Parts thus treated can be removed with ordinary tools and re-used simply by applying another drop of sealant which will restore full locking action.

• • •



PUSH BUTTON *Speed Selection*

from to in seconds

or to *any* intermediate speed, *instantly*

Just push a button and watch the large tachometer dial on the headstock!

It's that easy!

The work is done by a motor driven speed changer. It accelerates or slows the lathe to any desired speed in seconds. With a 10:1 ratio, this new variable drive makes it easy to select from a wide range of speeds—200 to 2000 rpm in direct drive and 40 to 300 rpm in back gear.

Maximum stability and smooth power transmission are assured because the drive unit is oversized. All pulleys and shafts are fully supported (eight bearings). Double V-belts throughout the drive eliminate slippage and deliver full power to the spindle. Because of this rigidity and extra pulling power, this lathe will take heavy cuts at all speeds and precision finish cuts at high speeds.

It is a precision lathe, moderate in price, with the versatility for toolroom, production or second operation jobs.

SHELDON *Variable Speed* PRECISION LATHES

Illustrated
WM56P
13" Swing- 34" Centers

Write for

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•

10", 11", 13" and 15" SHELDON Precision Lathes (Bench, Pedestal and Cabinet types)

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13" and 15" SEBASTIAN Geared Head Lathes

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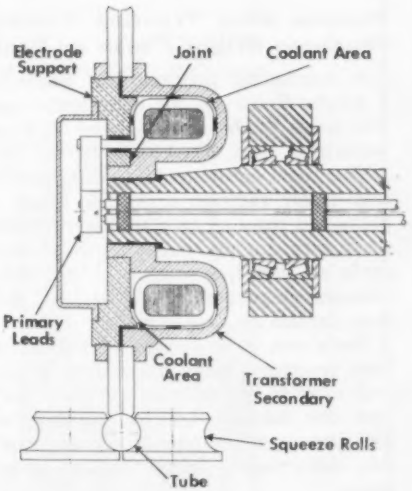
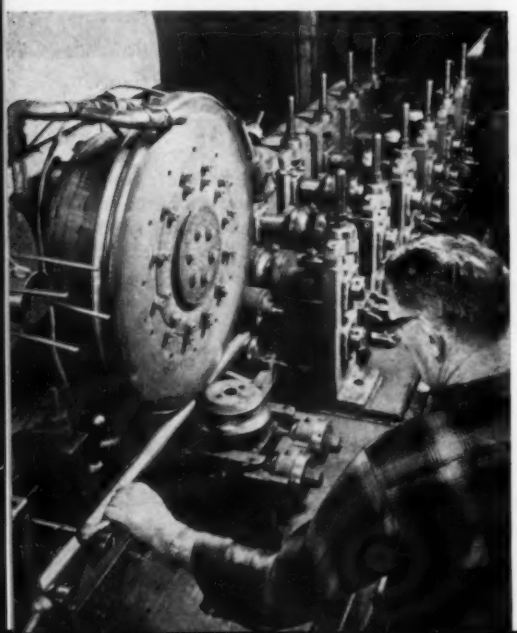
What's New in Metalworking

Transformer Design Speeds Production of Tube Forming

■ The competitive picture among manufacturers of resistance welded pipe and tubing is soon to change as more and more manufacturers convert their equipment to incorporate a new vapor-cooled toroidal transformer made by The Yoder Co., Cleveland, Ohio. The transformer both increases amperes-to-weld and decreases power input requirements.

Through the use of the new "Type-V" welder, pipe production is increased as much as 60% over that produced by previous equipment under identical power input and operating conditions, or identical speeds at greatly reduced power requirements.





On a prototype unit operating under production conditions, 12-gauge tube is being produced at 80 fpm, a 60% increase over the former rate of 50 fpm. Fourteen-gauge was formerly produced at 85 fpm and is now being produced at 106 fpm with smaller power input. During initial tests 18-gauge tube was produced at the rate of 120 fpm without taxing the equipment.

Key features of the "Type-V" are a "revolutionary" cooling system using a non-toxic fluorocarbon instead of recirculated water or oil, and a compact design. These make possible the elimination of the secondary conductor system, thereby greatly reducing the secondary impedance and permitting the current to be transmitted directly from the transformer to the electrode

The unit is completely self-contained. There are no hoses, no rotating seals, and no pumps, there is nothing to connect except the incoming power supply. Because of simplified design and construction, maintenance and downtime have been reduced.

For the man who has an existing welder, it is possible for him to replace the existing unit with a "V" unit which can be matched to his existing generating equipment and go into production with increased speeds on his present product. New tube mills will, of course, be more compact due to the characteristics of this new welder.

The Yoder Co., Cleveland, Ohio.

Use postpaid card. Circle No. 120

Vacuum Heat Treating Process Produces Bright Finish on Tools

A hardening process that produces a bright finish on all high speed and tool steels has been announced by Ipsen Industries, Inc., Rockford, Ill.

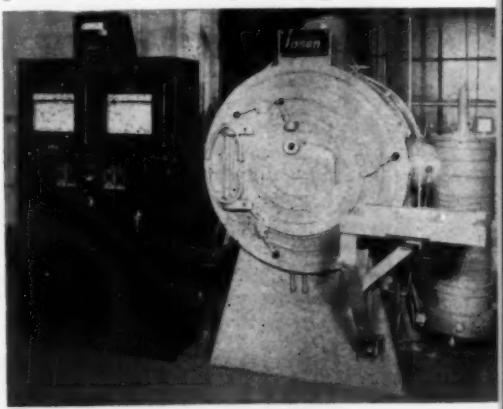
The basic equipment used is a modified Ipsen vacuum unit. The work is protected from oxygen and other oxide producers during the entire heat treat cycle so that the surface of the work remains clean and bright and no surface carbon is depleted.

Parts can now be finished prior to heat treatment since no surface decarb will have to be removed. As both work and the furnace are heated together and the parts are never moved while hot, distortion is at an absolute minimum.

Equipment for the process

Fast heating up to 2400°F coupled with fast cooling is obtained in Ipsen's new VFC-150 Automatic High Vacuum Heat Treating Furnace. This unit has a work space 15" wide, 24" deep, and 10" high; a maximum vacuum of 0.1 micron Hg; input of 50 kw; operating temperature of 2400°F.

To operate the unit, the work load is placed in a basket on the charging platform. The operator manually opens the door, swings the loading platform into position in front of the unit and pushes the work basket into the furnace. The platform is then swung aside and the furnace door sealed. At the control cabinet, the operator sets the time at pre-heat soak, and the time at high heat soak. After pressing the start button, the unit will automatically perform all functions, and upon completion of the last cycle, ring a bell



to signal the operator that the work can be unloaded. The unit can be immediately reloaded.

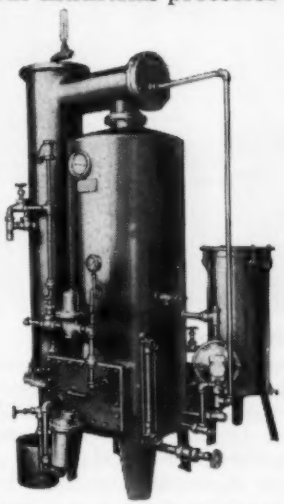
The VFC-150 pumping system consists of an 80 c.f.m. mechanical pump with controlled gas ballast and a 16" diameter 7500 c.f.m. 3-stage oil vapor diffusion pump. An operating pressure of 1 micron Hg is reached in approximately 15 minutes. The furnace employs graphite heating elements. Its cylindrical welded steel shell is water jacketed and closed at one end with a hinged vacuum sealed water-traced front cover.

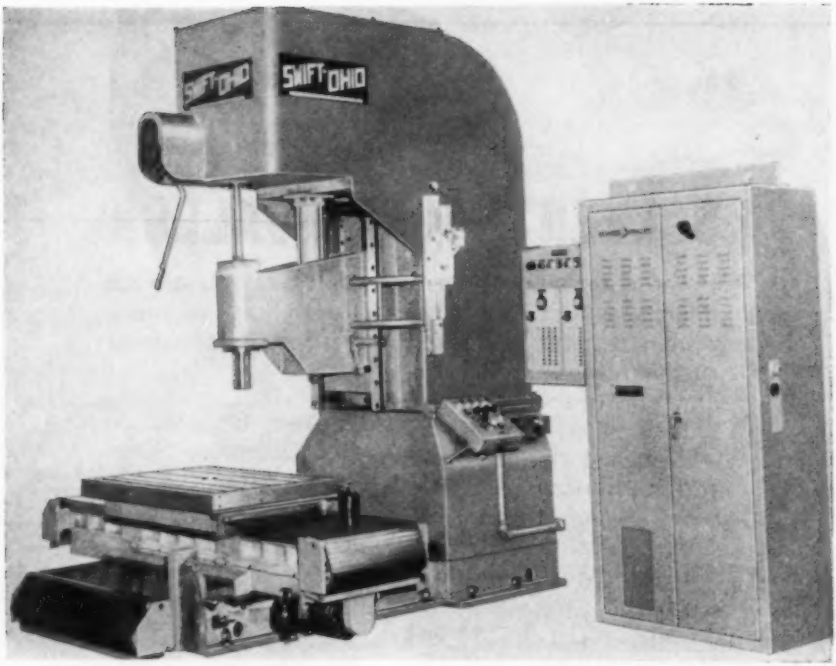
Ipsen Industries, Inc., Box 500, Rockford, Illinois.

Use postpaid card. Circle No. 121

SOLVENT—1¢ PER GALLON

If the petroleum or synthetic solvents you use for washing and cleaning parts, tools, fixtures, dies, paint stripping and in various industrial processes such as aluminum foil rolling, manufacture of extruded plastic parts, etc. —are being dumped down the drain after use—your money is going with them unnecessarily. Now it is possible to reclaim contaminated solvents—condition them to new solvent specifications with the low-cost Hoffman industrial distillation system. Savings in solvent can be expected to pay for the Hoffman equipment in a short time. To learn how a Hoffman vacuum distillation system can reclaim used solvents in your plant, send for Bulletin FB-101 together with Case Study #12 on a plant that has regularly recovered 80,000 gallons of petroleum solvent a year at a cost of 1c per gallon. Write Dept. MTB, **FILTRATION DIVISION, HOFFMAN INDUSTRIES INC., Thompson Road Plant #1, Syracuse, New York. HOward 3-0251**





Upright Heavy-Duty Drill

This Swift Ohio No. 425 upright heavy-duty drill represents a new approach to program control, in that drilling, boring, tapping, and positioning can be directed either automatically or manually. It eliminates the need for extensive setup, jigs, fixtures, and large inventory storage that has been a handicap on limited-production items.

The machine has a numerically controlled 24" x 36" compound table, hydraulic feed to spindle, eighteen-spindle speeds from 52 to 2250 rpm, and fine and coarse feed range.

In addition to its G.E. Mark II numerically positioning control with ¾-hp drive to each table movement, the machine shown features manual control and manual decade positioning. Repeatable electrical accuracy of the automatic control is .0005".

Swift Ohio Corp., Kenton, Ohio.

Use postpaid card. Circle No. 131

Sim 10" Production Lathe

A 7½-hp production lathe that is said to take heavier cuts than most lathes of the same class, as well as the most delicate cuts on frail workpieces, has been introduced by Pratt & Whitney. This lathe is especially designed for economical, efficient operation in small and medium job lot turning operations and is accurate to toolroom tolerances.

Called a Sim lathe, it reaches speeds up to 2800 rpm. The vibration-less performance needed to produce heavy cuts, delicate cuts, and fine finishes is possible because the cast-iron bed and base assembly form a solid and rigid unit. Nine forward and reverse speeds, as well as nine longitudinal and cross-slide feeds, are featured. Micrometer adjusted carriage slide stops trip the

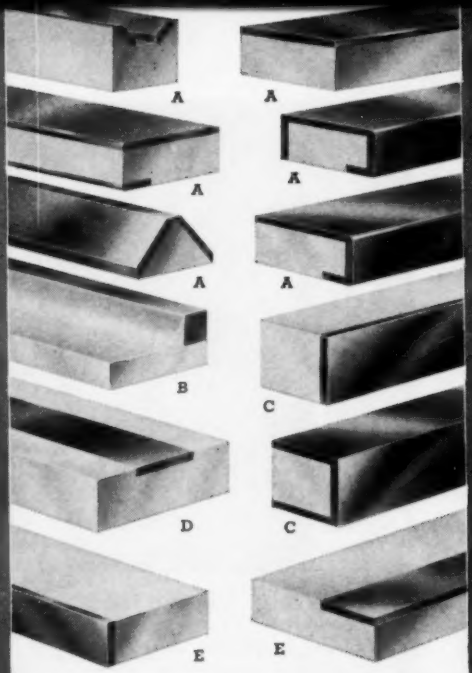
A—Hardened Ways and Slides

B—Composite Die Sections

C—Heel Block

D—Center Clad

E—Flange Slide



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hardened ways and wear plates

NEW SHAPES—12 cross sections.

NEW USES—for dies, die sections, flange sections, ways, gibs, rails.

88 SIZES—every practical width and height up to 168" length.

65-66 ROCKWELL—to full depth of tool steel along entire length.

READY TO USE—delivered with cutting, forming, wearing surface machined, hardened and ground. Soft steel backing quickly drilled.

LOWER PRICES—production in large quantities enables us to price them below yours or other makes.

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For FREE copy of 16-page Bulletin-A, giving complete data on OK ways, etc., write Dept. 123-D

THE OHIO KNIFE CO.
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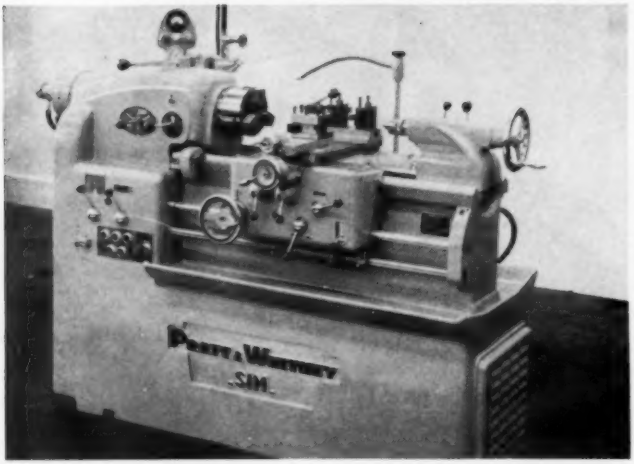

power feed to the carriage at any desired location. Repeat diameters are picked up quickly by selecting a preset cross slide stop.

Other features include automatic lubrication of all main units; case hardened and ground steel carriage ways of the inverted-vee type; hardened spindle and tailstock quill; and a meter that registers the power consumed to protect against overloading, and indicates any dulling of the cutting tool.

Pratt & Whitney Co., Inc., West Hartford 1, Conn.

Use postpaid card. Circle No. 132

Presses Speed Tube Bending

Two large bending presses for tube and pipe bending have been announced by Pines Engr. Co., Inc. The machines are 30- and 40-ton capacity models. They incorporate the necessary bending force to efficiently handle laminated tubing (one tube inside another) or heavy wall boiler tubing. Production speeds up to 800 bends an hour are attained.

Twin side-mounted hydraulic cylinders maintain a controlled die cushion pressure on the work. Bend angles are controlled by an indexing 10-position selector number of bends. Stop pins are adjusted to produce any angle up to 165°.

Models 30T and 40T require an area of 49" x 89" and 54" x 101" respectively.

Pines Engr. Co., Inc., 601 Walnut St., Aurora, Ill.

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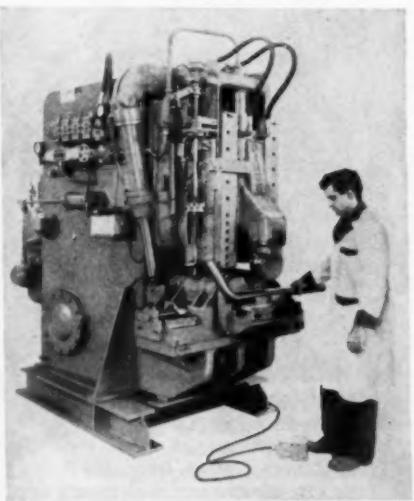

Instant Mixing Concentrates For Magnetic Particle Testing

A new family of materials for the wet method of visible and fluorescent magnetic testing is now being offered by Magnaflux Corp. The new materials, called concentrates, are all in powder form and incorporate features superior to the previous Magnaflux and Magnaglo pastes. The complete family consists of eight different materials, four for the visible red or black Magnaflux method and four for the more sensitive fluorescent Magnaglo method. Certain concentrates are formulated specifically for oil suspensions; others for water. Each has different characteristics related to particle size, magnetic properties, color contrast, and concentrations. This variety affords a choice of the optimum material for any given testing situation.

In preparing a magnetic particle test bath, these concentrates can be added directly to the oil after measuring the proper amount in a graduated cup. A uniform suspension is obtained almost immediately.

Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill.

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Improved Die Casting Machine

American Die Casting Machinery Co. has improved its model 150Z 150-ton, locking pressure die casting machine by adding a new hydraulic combination pump which delivers 21.8 gal. per min. This is said to double the previously possible output of die castings. The 150Z will complete a cycle in 2.8 sec. The new hydraulic development incorporates valving, which allows the regulation of pressures between the clamping cylinder and the shot cylinder to be isolated from each other.

The safety shot die interlock has also been redesigned for greater safety to operators from molten metal dangers, according to company officials.

American Die Casting Machinery Co., 1744 W. Winona St., Chicago 40.

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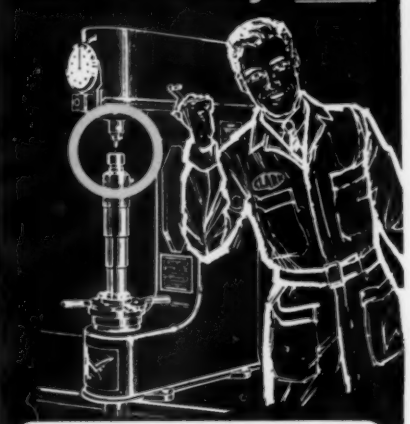
The Most For Your "Rockwell Testing" Dollar!



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CLARK HARDNESS TESTERS ARE *GUARANTEED* ACCURATE FOR ALL "ROCKWELL TESTING". CLARK'S EXACTING WORKMANSHIP IN THE PRODUCTION OF PENETRATORS, TESTING BLOCKS, ANVILS, AND OTHER ACCESSORIES PAYS OFF IN EXCEPTIONAL ACCURACY ON THE JOB. NO WONDER THE LOW COST SURPRISES OUR FIRST-TIME CUSTOMERS. *CLARK INSTRUMENT, INC., 10202 FORD ROAD, DEARBORN, MICHIGAN.*

FREE REFERENCE BOOK

Description and prices for Clark Hardness Tester and free Hardness Conversion Chart available on request.

Missile-Age Accuracy

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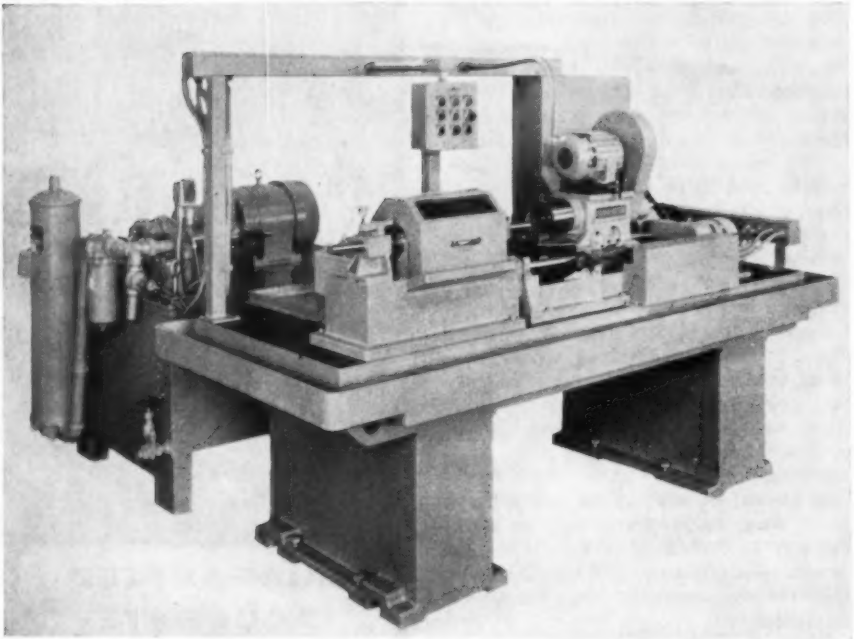


Fixed Bed Gun Drill With Hydraulic or Lead Screw Feed

Designed for production drilling of deep holes in ferrous or nonferrous materials, this fixed bed gun drill is offered by Leland-Gifford Co. It uses carbide tipped drills and is available with either a self-contained hydraulic feed or a lead screw feed.

Recommended for drilling accurate holes up to 5/8" diameter by 7" deep, the hydraulic feed model offers the advantages of highly uniform feed rate with simple feed rate changing. Pump and spindle are independently powered with a 1½ hp. spindle motor. Variable speed drives are available for speeds up to 10,000 rpm.

For holes having depth greater than 7", this 24C electro-mechanical gun drilling unit can be furnished with 12", 24", or 36" stroke.

It can be furnished with or without tooling for specific operations, or as a drilling unit on a do-it-yourself basis. Also available is a high pressure coolant system with an oil capacity of 100 gal.

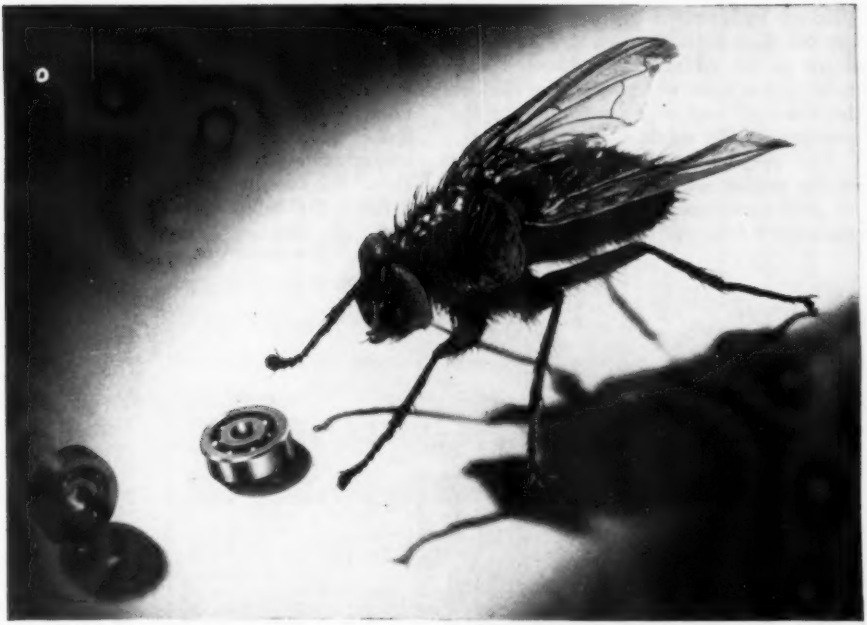
Leland-Gifford Co., Worcester 1, Massachusetts.

Use postpaid card. Circle No. 61

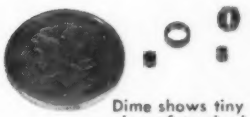
Die Thread & Forming Machines Improved to Reduce Setup Time

Changes in Reed Rolled Thread Die Co. heavy-duty Models A33A and A34A three cylindrical die thread and form rolling machines have reduced setup and changeover time.

The firm's thru-feed principle of rolling is now possible in the A33A machine when using dies set at either parallel or skewed axis. Feeding of the work with parallel axis dies is accom-



Can parts this small be barrel finished?



Dime shows tiny size of typical bearing races.

Twin-barrel ALMCO Supersheen Model DB0-1A used by Miniature Precision Bearings to process the tiny bearing assemblies.

EMPHATICALLY, YES! For example, precision deburring and finishing of small parts with ALMCO barrel finishing equipment is an important operation at the modern new plant of Miniature Precision Bearings, Inc., Keene, N.H.

M.P.B. makes miniature ball bearings, some with assemblies so tiny that 500 can be carried in a thimble. ALMCO precision equipment and methods are used to improve surface finish on the inner and outer races, as well as removing burrs, sharp edges and machining lines.

Production usually runs 1,000 to 4,000 parts per load, and occasionally 5,000 to 15,000. All told, millions of parts yearly are finished the ALMCO way at Miniature Precision Bearings!

If you have finishing problems with your parts, small *or* large, perhaps ALMCO has the answers. It's easy to find out. Just write on your letterhead asking for an ALMCO sales engineer to call. Or, if you prefer, send sample parts and specifications desired direct to ALMCO's main lab at Albert Lea, Minnesota.

SEND FOR FREE 52-PAGE HANDBOOK

Tells all about modern precision barrel finishing processes. Facts, photos, data and cost comparison charts.

ALMCO
Supersheen

Queen Products Division Of King-Seeley Thermos Co.
47 Marshall Street, Albert Lea, Minnesota

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plished by using a greater lead angle on the dies than that of the thread or form to be rolled. With skewed axis rolling, the axes of the dies are skewed between 0° and 5° to provide for the feeding of the work.

The A33A is now equipped with a 40 hp motor and redesigned gear box to give continuous thru-feed rolling of diameters from ⅝" to 2½".

Model A34A is equipped with die holders designed to accommodate 5" wide dies.

Die holders for both machines have been redesigned to include removable front bearing supports. This permits changing or replacing the dies without removing the die holders.

Reed Rolled Thread Die Co., 791 Main St., Holden, Mass.

Use postpaid card. Circle No. 62

Sperry Tape Controls Applied To Burgmaster Turret Drills

The Sperry gyroscope numerical control system has been developed for the Burgmaster line of six- and eight-spindle turret drilling machines. This system employs linear coil transducers to pin-point the measurements that determine the final X-Y positions of the table. Table positioning is by hydraulic cylinders. Accuracy of the system is unaffected by any slight mechanical anomalies that may be introduced by the transport mechanism. Positioning accuracy is held within .0005", repeatable to .0002".

The pedestal mounted operator's panel also contains manual input knobs that permit the operator to set X-Y axes dimensions during setup, inspecting, or handling "on-off" jobs. No computer is required to program the job for tape preparation.

Burgmaster Corp., 15001 Figueroa Ave., Gardena, Calif.

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JULY, 1961

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MACHINE and TOOL BLUE BOOK

A Hitchcock Publication

WHEATON, ILLINOIS

Readers' Service Department

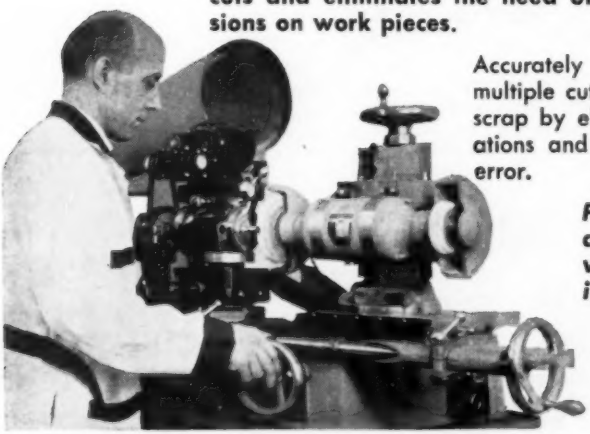
Fringe Benefits!

If you have investigated R-O relief sharpening for cutting tools, you know that they not only deliver more cuts per grind, but more grinds per tool. Has it occurred to you, though, that there are these additional fringe benefits!

Better intersection of blades such as pilot and counterbore, eliminates burrs and the need for deburring operations.

1-2-3-4

Combination axial and radial fixture actuation makes it possible to dress two or more operations on the tool at the same time. This holds positive relationship between cuts and eliminates the need of inspecting all dimensions on work pieces.



Accurately holding dimensions on a multiple cut tool means reduction of scrap by eliminating separate operations and the occasion for human error.

Progress of tool grind can be checked optically without removing tool or interfering with set-up.

PUT IT ON THE PRINT—
"Put it on the R-O"

RO
UNIVERSAL FORM RELIEVING FIXTURE

R-O Grinder

R-O MANUFACTURING COMPANY
31171 Stephenson Highway,
Madison Heights, Mich.

Please forward the R-O catalog

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Friction Welding Joins Wide Range of Materials

American Machine & Foundry Co. has developed a process that welds a vast range of different materials, such as copper to brass, brass to aluminum, and aluminum to steel, in addition to ceramics, plastics, and other combinations.

This friction weld method uses light pressures and high speeds. In many cases, it eliminates the need for fluxes and special gaseous atmospheres. Friction welding is a process by which the mechanical energy of two objects revolving in contact with one another is converted into thermal energy. Since it takes place along a circular path, the process is particularly suited to joining bars or tubes.

American Machine & Foundry Co., Research & Development division, 689 Hope St., Springdale, Conn.

Use postpaid card. Circle No. 66

"Drill-Guide" For Straight Holes

Ames Precision Machine Works has introduced a portable drill accessory claimed to guarantee drilling of straight holes in any direction—horizontal, vertical, and angular—and countersinking and reaming "in line."

Two graduated dials regulate the drilling; one controls left and right, the other, up and down.

Ames Precision Machine Works, Waltham, Mass.

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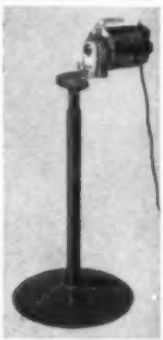
BEVERLY *Electric* THROATLESS SHEAR

Cuts Any Shape in Metal Easily, at High Speed

Provides 1725 cutting strokes per minute . . . correct speed to handle cutting, trimming and slitting operations in any metal to shear's capacity. Unique downward-forward shearing action provides faster, cleaner cutting; insures longer blade life. Operator's hands are free to feed and guide work through shear—permits accurate cutting to a line or template. Throatless design allows sheet to be turned in any direction during cut. Motor operates on 110V., 60 cycles, AC.



Complete with base and supporting column to provide most efficient and comfortable working height from floor. Can be used with base only as bench shear.

See your nearby Beverly Distributor for a demonstration or write today for illustrated circular.

BEVERLY SHEAR MFG. CORP. 3005 W. 111th Street, Chicago 55, Illinois

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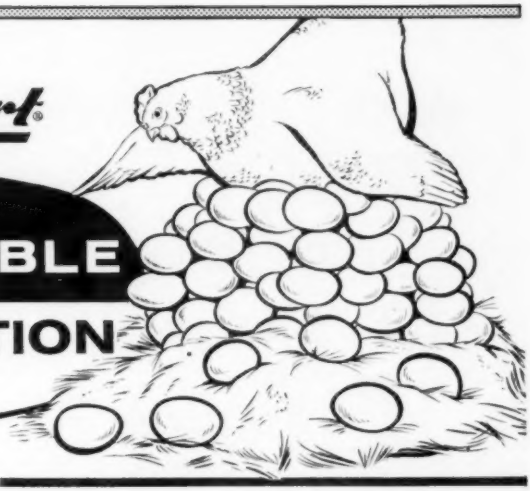


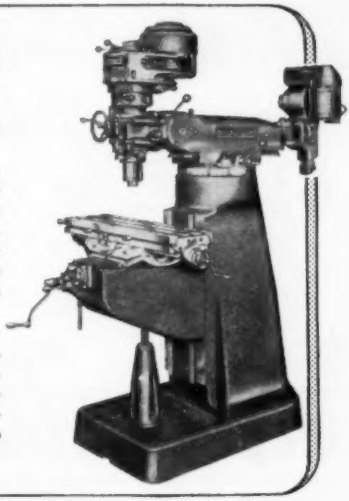
PROFITABLE PRODUCTION

"The Most for the Least"

Experience in countless shops, large and small, points to the fact that jobs are handled profitably at low cost with maintained precision on versatile BRIDGEPORT TURRET MILLING MACHINES. Adaptability of "Bridgeports" to tool room or production line accounts for their universal acceptance.

Recently, Bridgeport told the story of a plant where a Bridgeport Miller prototyped an important piece of military equipment. This machine proved the "nest egg" for a successful and profitable business. Starting with a single machine, this plant's requirements have grown to where a battery of sixteen "Bridgeports" is now in daily operation on a wide range of work.

Thus we find "Bridgeports" handling milling, drilling, boring, right angle milling, slotting, cherrying, fly cutting, profiling and hydraulic duplicating. Constant development of attachments has contributed to versatility. Precision not only assures profitable production but also means a high return on a most moderate investment.



For further details consult your nearest dealer or us direct.

Bridgeport® MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

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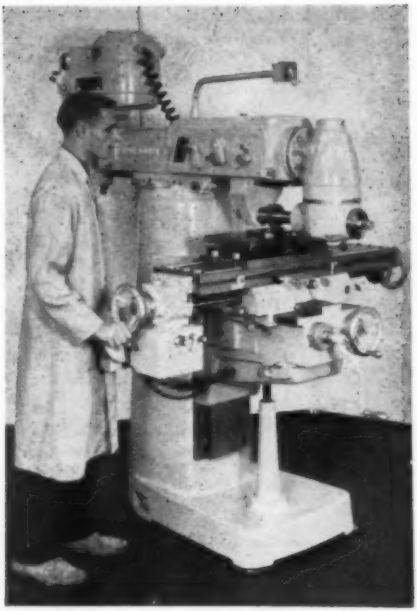

Versatile Milling Machine

A new turret-type milling machine with a spindle head for horizontal milling with arbor mounted cutters, as well as for vertical and angular milling with the spindle head swiveled and the arbor support removed, has been announced by the Milling Machine division of The Cincinnati Milling Machine Co.

This machine, known as H-V, can be equipped with any one of three different vertical heads on the opposite end of the overarm. To change from horizontal to vertical or angular milling, four bolts are loosened, and the overarm and turret base swivel as a unit to locate the vertical head over the table.

Features on this hand feed machine include a square saddle-knee bearing, rectangular overarm mounted in a swivel turret on top of the column, oil-shot lubrication, and eight spindle speeds.

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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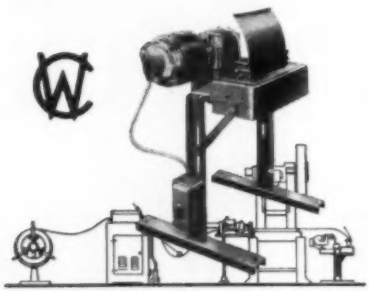
Double Wedge Fixture Centralizes Castings

A double wedge fixture that centralizes and clamps small ferrous castings for drilling, threading, tapping, and hollow milling operations has been developed by The Bodine Corp. This fixture enables a Bodine dial-type machine to work three different valve body castings with the same tooling by the serrated clamping jaws. Parts are run through the machine twice. The first pass machines one horizontal lug and the vertical lug; drilling, hollow milling, threading, or tapping as the specific valves require. The part is then run through again to machine the other horizontal lug and deburr the vertical hole for any breakthrough burrs.

Valve bodies are fed manually and a retaining strip holds them in place un-



scrap choppers

Cooper Weymouth scrap choppers take skeleton strip directly from press — chop it quickly and efficiently into easily handled size for collection. Three self-contained sizes, adjustable angle heads, for stock to .156 x 5" or .093 x 12" (mild steel). Write for details.

COOPER WEYMOUTH, INC.
604 Honeyspot Road, Stratford, Conn.

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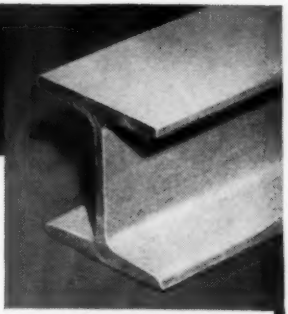
STONE SS-100-LR TRAVERSE TYPE CUT-OFF SAW



6" x 6" x ¼"
15.5#
H-BEAM

Just 33 Seconds to Cut 6" H-Beam

This 6" structural H-Beam is cut in a single, 33-second pass at the Syracuse Engineering Company. For precise, square and clean cuts with economy of speed and wheel wear, Syracuse Engineering depends on this Stone Model SS-100 LR with the geared-in-head motor that develops full 10 HP. The 22" semi-hi-speed steel friction blade gives up to 1000 cuts per sharpening.

There's a Stone cut-off machine to fit every production line or machine shop requirement. Choose from manual, semi- or fully-automatic chop-stroke or traverse type machines. Steel, friction or abrasive wheels are available to cut ferrous or non-ferrous metals such as bar, pipe, tube, structural, sheet or plate.

Discover the profit possibilities of a Stone high-speed, cut-off machine in your plant. Write or phone for full details.

Stone MACHINERY CO., INC.
MANLIUS, N. Y.
HIGH SPEED CUTTING MACHINERY

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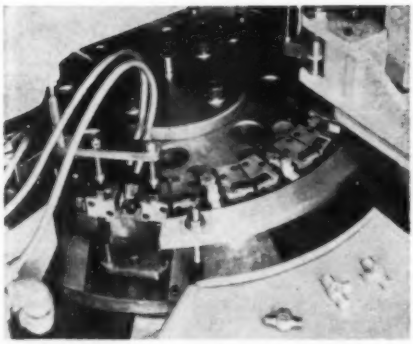

til they are clamped by a toggle unit. This fixture centralizes and repeats to .001" accuracy.

The Bodine Corp., 317 Mt. Grove St., Bridgeport, Conn.

Use postpaid card. Circle No. 69

Pneumatic Vibrator Line Has Impact-Frequency Adapters

The Branford Co. has announced two models of its pneumatic vibrators that are operated by an impact-frequency adapter which gives full range control to impact and frequency.

Shown is the 3" model. A smaller 1¼" size is also available. Close control of input compressed air allows the vibrator to be adapted to the most efficient vibrations for flow of materials.

Features include air passages which cannot plug, and starting and stopping at low line pressures (3 psi for the 1¼" giving 2400 vpm, and 3 psi for the 3" giving 980 vpm).

The Branford Co., 130 Glen St., New Britain, Conn.

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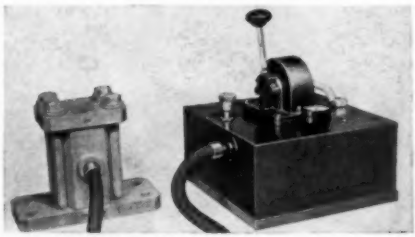
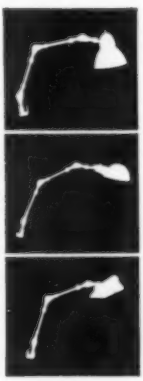


FOSTORIA

BALANCED® LIGHTING PROMOTES INDUSTRIAL SPEED



Speed on the production line is the result of skill. But skill is the result of confidence, and without proper work area lighting confidence is reduced. However, BALANCED® lighting in critical work areas allows production people to work fast with accuracy and safety. Ask a Fostoria representative to check your production line for BALANCED® lighting. No obligation. Write for free copy of "CRITICAL WORK AREA LIGHTING."

FOSTORIA CORPORATION • FOSTORIA, OHIO

MANUFACTURERS OF CRITICAL WORK AREA LIGHTING

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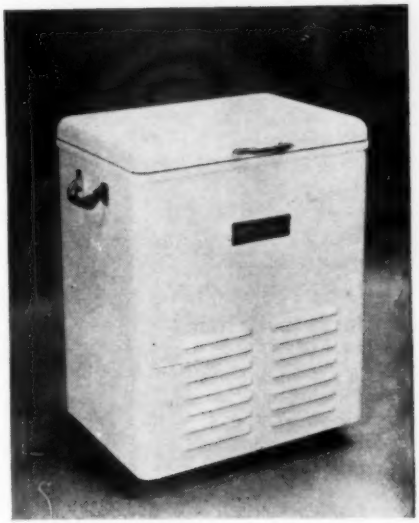
Miniature Environmental Chamber



Cincinnati Sub Zero Products' new .5 cu. ft. environmental chamber has been designed for R-D testing, moderate job shop applications, expansion fit assembly, as well as medical research and pharmaceutical-biological storage.

This Penquin/5, as it is called, occupies less than 2½ sq. ft. of floor space, and is caster-mounted for ease of portability.

Standard low temperature range is from —10° to —60°F; it is available with a high range of 500°F. The chamber is 15" long, 9" wide, and 8" deep, and is surrounded by 2¼" of low "K" factor insulation.

Cincinnati Sub Zero Products, Engr. Dept., 3932 Reading Road, Cincinnati 29, Ohio.

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New VOGEL AUTOMATIC CUT-OFF MACHINES

Pneumatic or Hydraulic

Units shear clean to accurate lengths FAST with practically no burr or distortion

SAMPLES were sheared off by new Vogel Automatic Cut-Off Machines.

SELF contained CUT-OFF unit complete with base cabinet, all necessary switches and controls, ready for operation.

Phone FILLMORE 5-0160, or write to.

VOGEL

VOGEL TOOL AND DIE CORPORATION
1827 North 32nd Avenue. • STONE PARK, ILLINOIS

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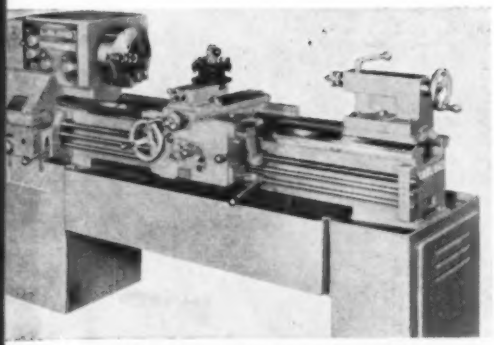


LeBlond Redesigns Regal Lathe Line

New design features of LeBlond Regal lathes are particularly apparent in the headstocks, which have all undergone a transformation in controls to unite maximum ease of operation with maximum efficiency, according to the company. The Regals incorporate heavy three-bearing spindles, automatically lubricated and totally enclosed quick-change boxes, motor enclosed in head leg, and compensating V-ways to provide accurate carriage guidance and to distribute cutting forces in the bed.

A complete line of accessories is available, including Regal Trace, which works form flat templates.

R. K. LeBlond Machine Tool Co., Madison and Edwards Roads, Cincinnati 8, Ohio.

Use postpaid card. Circle No. 72

Pocket Instrument Shows Degree of Residual Magnetism

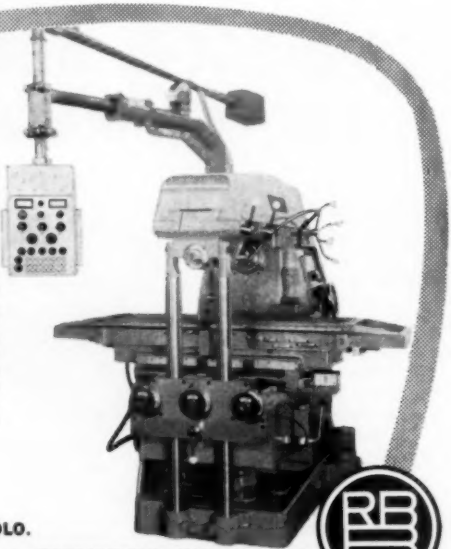
A pocket instrument that instantly measures the degree of residual magnetism in steel tools, parts, and structures is offered by R. B. Annis Co.

Called a pocket magnetometer, it readily indicates low residual magnetism levels required for good "fuzz free" parts cleaning. It can also measure

BOHLE

THE LATEST DESIGNS IN MILLING MACHINES . . .

Here's the newest and most advanced Horizontal Knee Type with such features as: Increased cross travel; square ways providing greater rigidity, lateral and vertical clearances can be easily and separately adjusted; greater working height; movable control panel; electro magnetic clutches; wide gutters for coolants; greater dial visibility and numerous safety features. Can also be equipped with a program for longitudinal table movements. There are so many other advantages you'll want to see . . . so send for helpful, fully illustrated literature. Write, phone or wire today. No obligation.



REINHARD BOHLE MACHINE TOOLS, INC.

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• KNEE TYPE MILLING MACHINES • PRODUCTION MILLING MACHINES • PROGRAM MILLING MACHINES • COPYING MILLING MACHINES • BED TYPE MILLING MACHINES—SPECIAL MACHINE TOOLS

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and compare unusually strong magnetic fields by maintaining a known distance between the instrument and object being tested.

The instrument is particularly useful in work with hardened steel parts that are prone to pick up and retain magnetism from magnetic chucks, magnetized machine tools and magnetic conveyors.

In operation, a red spot on the bottom of the magnetometer case is placed near or against the object to be tested. The pointer immediately deflects to a reading on the scale proportional to the magnetism in the part at that point. The higher the reading, the stronger the magnetic field. Magnetic polarity is indicated by the direction of pointer deflection on the center-zero, 20-0-20 scale.

R. B. Annis Co., 1101 N. Delaware St., Indianapolis 2, Ind.

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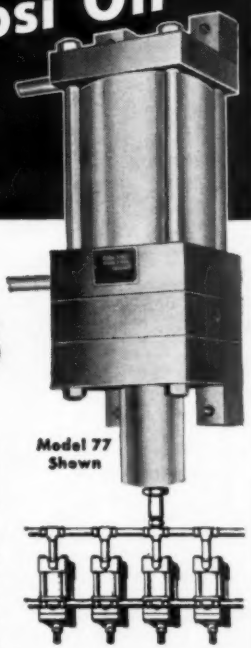
Up To
10,000 psi Oil
from
Shop Air!

Miller AIR TO HYDRAULIC
BOOSTERS

No Pumps or High Pressure Valving Needed

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.



Model 77 Shown

Write For Full Details

Miller FLUID POWER DIVISION
Flick Reedy Corp
7N022 York Rd., Bensenville, Ill.

For information or service please call us "collect", PORTER 6-3400 Bensenville, Illinois, person-to-person-rate, from anywhere in the U.S. or Canada.

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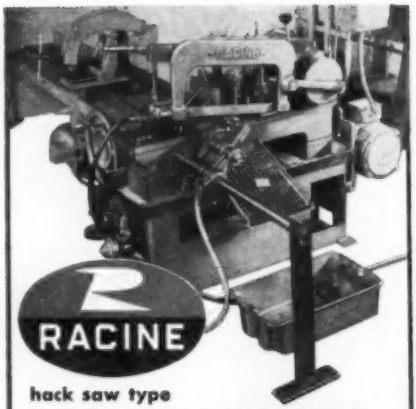


hack saw type

CUT-OFF MACHINES

save you man-hours

- Saws without supervision
- Easy stock positioning; simple control
- Fast set-up, and easy blade changing
- Air- and hydraulic-operated vises
- Automatic stock feeds for multiple bars

reduce your cost per-piece

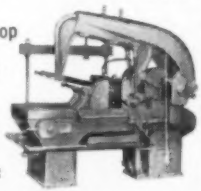
- Self-adjusts to fastest feeds
- Accuracy to .005"; angles to 45°
- Shear-action stroke cuts maximum metal
- Lift on return lengthens blade life
- Cut one or 1000 pieces . . . mild, alloy, and die steels; exotic and non-ferrous metals
- Choice of 2-, 4-, and 6-speed drives

dependable for long life

- Oil-smooth hydraulic-powered feed
- Extra-large bearings . . . 90% self-lube
- Require little adjusting
- Product of 50 years' experience and continuous engineering improvements

RS-118

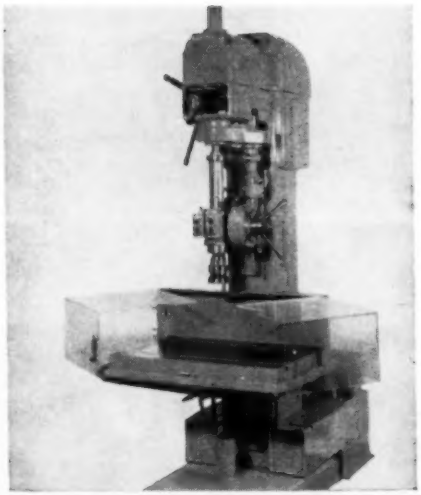
Production and job-shop models, 6" x 6" to 24" x 24", wet or dry



Free information
Write today for full details and name of nearby dealer, to:

Racine Hydraulics & Machinery, Inc.
Department G281, Racine, Wisconsin

Use postpaid card. Circle No. 296



Drilling Machine Features Hollow Spindle For Coolant

Buffalo Forge has introduced a hollow-spindle drilling machine for drilling super-hard "exotic" materials.

Called RPMster, this drilling machine features variable feeds and a transfer attachment for introduction of coolant through the spindle under pressure. This unit can drill such super-hard metals as titanium, stellite, rene 41, and stainless steel, as well as some of the hardest new ceramic materials.

Buffalo Forge Co., 490 Broadway, Buffalo 5, N.Y.

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Positive Belt-Tracking Backstand

A backstand, designed for positive belt-tracking under heavy work pressures, is now being offered by Murray-Way Corp.

This unit ideal for deburring, surfacing, squaring, grinding, and polishing, can be driven by a lathe wheel or any other powered wheel. It employs an idler roll and a Murray-Way "air eye" which prevents belt run-offs.

Units may be mounted on a standard Murray-Way L10 or L12 lathe, and

buffing heads. It comes in two models for use with 6" or 12" abrasive belts.

Murray-Way Corp., P.O. Box 180, Birmingham, Mich.

Use postpaid card. Circle No. 75

Chucks for Surface Grinders

Rotary electrostatic chucks, designed for use on true rotary type precision surface grinders, are now available in 6" and 12" sizes from Electroforce, Inc. With these chucks, the problems encountered in holding flat, ring-shaped parts for surface grinding are said to be solved. These chucking systems will hold any conductive material, including brass, copper, aluminum, stainless steel, beryllium, and other "exotics," for surface grinding or machining. They will also hold thin flat sections of magnetic materials with uniform tension.

Electroforce, Inc., Fairfield, Conn.

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RB

INTERNAL CUTTING TOOLS

4 DISTINCTIVE STYLES IN CARBIDE & HSS

SIZES FROM 3/16" UPWARD

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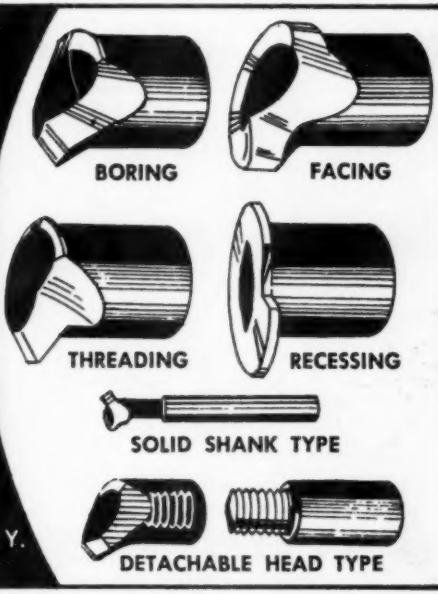

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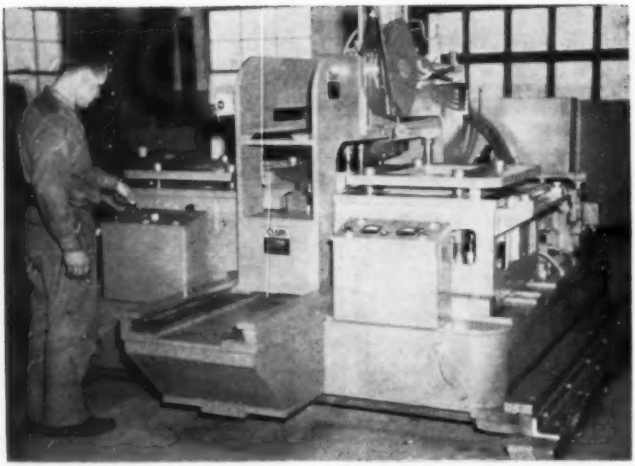

Shear-Welder for Tube Mills

To keep tube mills and roll-forming machinery in continuous production, this shear-welder joins each successive strip to the preceding one automatically. It is located at the entry side of the mill.

The unit shears off the tail end of the old coil and the front end of the new one, butts the two together, and

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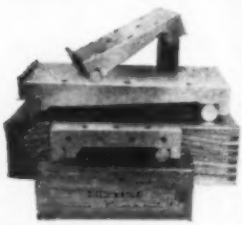

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New Dual Field permanent magnetic chucks with extra holding power. Positive lock on each axis.

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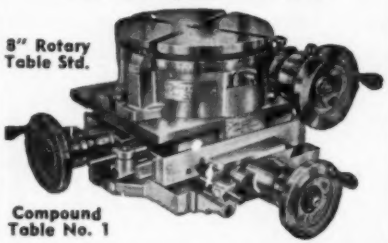

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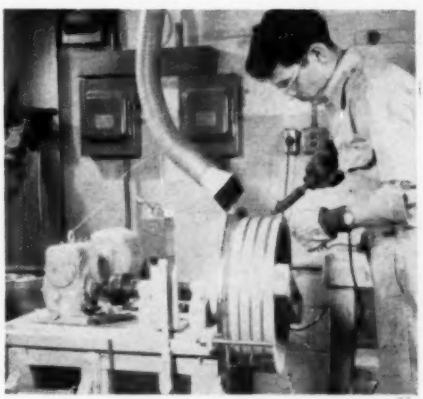

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THE BLANCHARD MACHINE COMPANY

64 State Street, Cambridge 39, Massachusetts

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welds them. While this is taking place, the mill draws its strip from a looping tower above the machine. The tower stores approximately double the number of feet of coil as the fpm speed of the mill. The mill never shuts down for coil changes.

Either TIG or MIG welds can be made. In the shearing, the camber is produced in the slug, not the strip, so that further preparation of the joint for free movement through the mill is unnecessary. Either ferrous or nonferrous strip can be handled. Illustrated machine has a capacity for 21" wide coils. Clark Co., Walbridge, Ohio.

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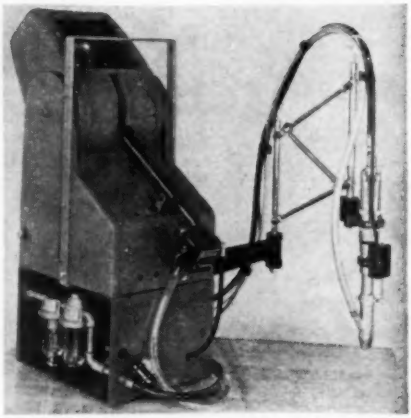
Portable Tool Mount

A portable ball-bearing supported tool mount called "Radarm" is now available with all standard models of Tru-Tork automatic screwdriving systems. Radarm moves laterally at the slightest touch and is designed to hold the tool in a vertical position at all times with no side pull.



It can also be used with other tools, such as drills, tappers, and impact wrenches. Radarm is suited to bench operations or where assembly belts are used in a production line.

Clyde Engineering & Mfg. Co., 937 E. 10 Mile, Madison Hgts., Mich.

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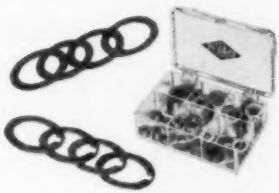

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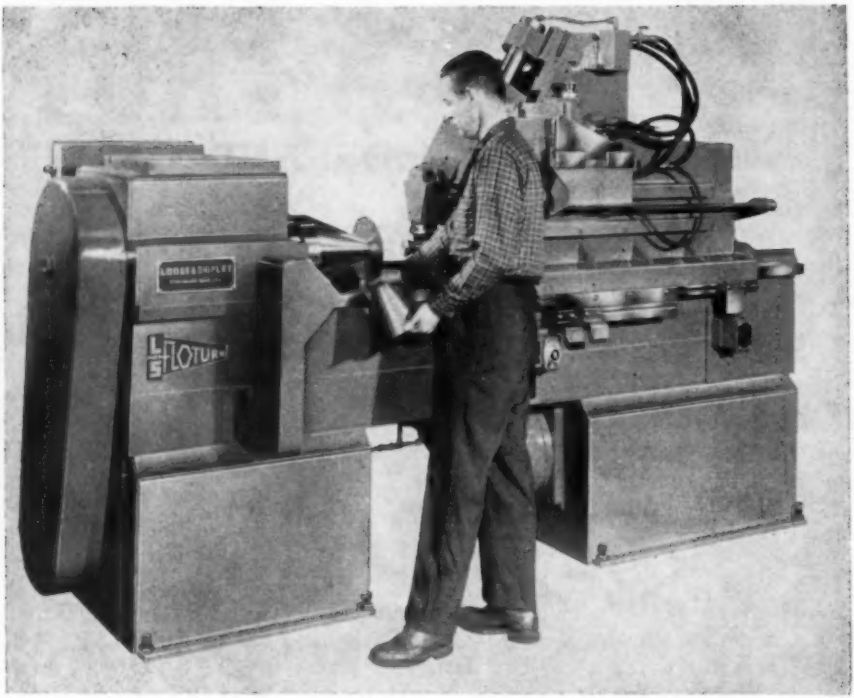

Tracer-Controlled Floturn Unit For Lighter Gage Production

A compact Floturn machine, specifically designed for shear forming of lighter gage metals, has been announced by Lodge & Shipley Co. This No. 12 horizontal Floturn features all-hydraulic operation, including automatic hydraulic tracer control of its single forming roller.

It produces parts ranging up to 12" in diameter and 15" long. The machine itself is approximately 10' long, 4' wide, and 6' high. It is equipped with an eight-speed spindle drive from a 15 hp motor or optional variable-speed drive.

Other features include a rugged headstock with precision oversize bearings and automatic lubrication, an automatic cycle operation, a yieldable tailstock, reversible roller head, 60° roller slide, adjustable feed cams, integral coolant system, and two separate hydraulic systems.

Floturn Division, The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

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Cutter Compensation System For Bendix DynaPath

Bendix Industrial Controls section has announced the availability of a cutter compensation system as an option on its Dynapath 20 series of numerical contouring controls. With cutter compensation, it is possible to machine accurately with cutting tools varying as much as .050" from the programmed diameter. This permits the

Any spring made fast in your shop!

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For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005″ to .125″, you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32″ to 12″ and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!

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MACHINE AND GEAR CO.
Special Machinery Division,
West Springfield, Mass.

Starrett adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

Perkins Machine and Gear Co.
Special Machinery Division, Dept. A-2
W. Springfield, Mass.
Please send information and prices on Perkins Spring Coiler.
Hand Model ☐ Power Model ☐

Name.....Title.....
Company.....
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machine operator to use reground tools, or to make both roughing and finishing cuts with the same tool and the same tape. This compensation system generates a secondary signal which is superimposed on the command signals that operate the machine's servo drives. Because of this, the required correction is proportioned to each axis, producing a normal offset regardless of the direction or curvature of the cutter path.

The Bendix Corp., Industrial Controls section, 21820 Wyoming, Detroit 37, Mich.

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New Manufacturing Lathe

A manufacturing lathe has been announced by Rivett Lathe & Grinder, Inc., Boston, Mass., that will serve

Vibration eliminated to 0.000,010"

Sensitivity: Measurable unbalance displacement: (10 micro-inches) 0.000,010" ● Measurable max. unbalance displacement double amplitude: 0.375" ● Dynamic, pure static, or Force-Couple Indication ● Easy to operate and maintain – locate anywhere ● No foundations or hold-downs needed ● Rotor weight: 2 oz. to 100 lbs.

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Model MU-6

for rotors, armatures, impellers, pulleys, drums, etc.

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where extreme precision is required for quality work. This model 1020M offers increased flexibility taking a ¼" cut in cold rolled steel or turning within .0004" in 12". With a 12½" swing, the spindle takes collets up to 1⅛" capacity, and the machine is available with either 20" or 30" centers. Power longitudinal feeds are from 0 to 16" per min. and power cross feeds from 0 to 8" per min.

The tracer unit does not interfere with conventional operation when using standard compound. Swivel mounted, the tracer turns between centers using power longitudinal feed, or work held in face plate using power cross feed.

Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass.

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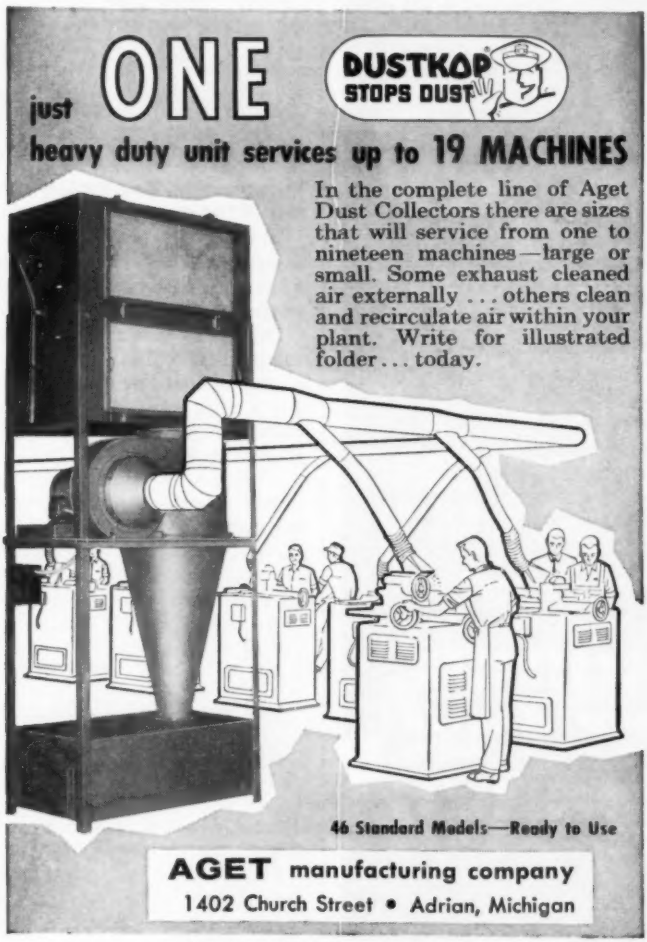
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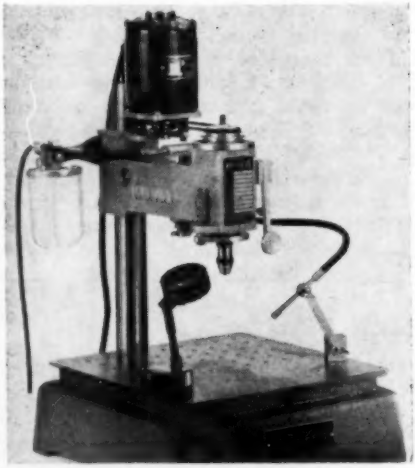

Pneumatic Controlled Spindle On Precision Drill Press

Mico Instrument Co. has developed a model 905 precision drill press with a pneumatically controlled spindle for production drilling of very small holes.

Design is claimed to reduce deflections when drilling, thus increasing the accuracy of the holes and reducing small drill breakage. The fine adjustment for the spindle provides a controlled approach of the drill to the work surface and a steady, even feed to the preset depth. Provision is made for mounting an air mist accessory unit on the drill press when air mist or air stream is needed to keep the drill cool or clear away chips.

An Albrecht keyless drill chuck of ⅛" capacity is standard equipment and a choice of 7500 or 10,000 rpm motors of 1/10 hp are available.

Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass.

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Non-Deforming Properties of Steel Minimize Punch Breakage

Powdered metal parts having intricate shapes with both thin and heavy sections can be punched with the use

of Carpenter R.D.S. (AISI type L6) matched tool and die steel.

This steel is claimed to have stability in heat treating and ease in machining and grinding. It is an oil-hardening die steel with non-deforming properties. It has no special tendency to decarburize and its machinability is rated at about 75% that of plain carbon water-hardening tool steel.

Carpenter Steel Co., Reading, Pa.

Use postpaid card. Circle No. 83

Motor Drive Attachment Powers Manual Machines

A motor driven power attachment for hand-operated machines, incorporates protection of the motor thus enabling the machine to drive up to a stop, has been developed by M & M Tool & Mfg. Co. This unit has a limit switch which can be added to reverse the motor.

The motor drive can be attached to rotary tables, vertical mills, grinders, and many other units that require power feeds.

A hand shift lever can be purchased to disengage the unit, which has a variable-control motor to suit many applications.

M & M Tool & Mfg. Co., 1124 E. Third St., Dayton 2, Ohio.

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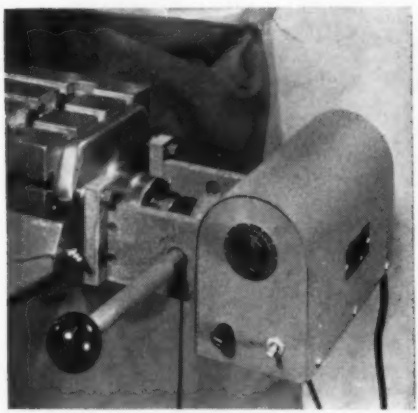

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MILL-ALL CARBIDE TOOLS

*on conventional toolroom machines

TYPICAL USE (shown)

Product change made quickly, inexpensively on this hardened die (D2 steel—61 RC) by P.&F. Corbin Div'n., American Hardware Corp. with MILL-ALL Carbide Tools. Eliminates annealing deformation. No filing operation needed. Details on request.

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MILL-ALL research brings you: top grade carbide combined with advanced design. Permits easy sharpening, long life, accuracy. Complete line of standard sized drills, end mills, counterbores, boring bars, priced competitively.

RPM, size, style stamped into shank.

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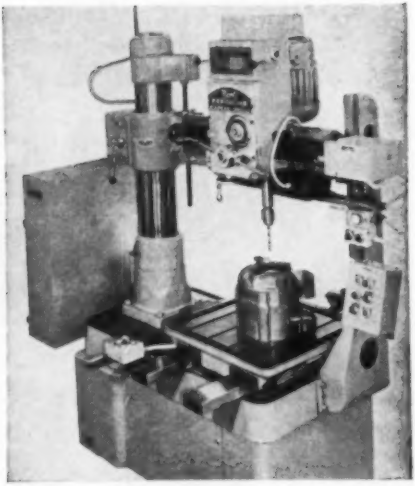

Radial Drill Has Numerical Control

A radial drilling machine which features a Singer numerical-control system has been produced by Veet Industries. A rigid short column provides the spacing and positioning accuracy. A gantry column adds further rigidity.

Locking of the arm at both columns is positive and is performed automatically whenever the arm is repositioned. An X-axis measuring system is built into the arm, traversing the drilling head by a servo-motor drive with ball screw through a range of 20". Spindle runout is less than .0002".

A Y-axis measuring system is in the 25" x 25" table. With rapid traverse of 60", the table positions workloads up to 1000 lbs. The radial drill is available in three models.

Veet Industries, 25753 Groesbeck Hwy., East Detroit, Mich.

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Attachment Controls Backlash On Milling Machines

A redesigned rotary head milling attachment for use with horizontal or

WALLS TU-WAY BELT SANDER

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Full 1/3 h.p. G. E. Motor

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head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindle.

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THE GRANT MFG. & MACHINE CO.

CE Station Bridgeport 5, Conn.

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vertical milling machines has been announced by Everede Tool Co.

According to company engineers, the attachment has a large 10" pitch diameter worm gear and adjustable spring-loaded worm to regulate the amount of backlash between the worm gear and the gear. The unit's motor track has been relocated so it is now fixed to the pulley guard. This increases the rigidity of the device and makes for a more compact unit, according to the company.

A six-step cone pulley provides spindle speeds of 310, 450, 720, 1100, 2100, and 4300 rpm. The attachment includes a ½ hp motor with either single phase 110/220 volt or three phase 220/440 volt, complete with reversing switch and line cord ready to plug in.

Everede Tool Co., 2000 N. Parkside Ave., Chicago 39, Illinois.

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Vertical Pneumatic Grinders

Thomas C. Wilson, Inc. now has two series of low-profile lightweight portable pneumatic vertical grinders for cup wheel and depressed-center wheel grinding, and sanding and wire brushing work. Series 907 and series 908 grinders are designed for ease of

proven

BACKUS CUT-OFF MACHINES

For High Speed Cutting of All Types of Metals and Materials At Any Angle!

Ill. Model 1260

Backus Cut-Off Machines make the finest precision cuts on any material, **at any angle**, to meet your most exacting cutting requirements. Precision engineered, these machines — complete-ready-to-operate — combine sturdy construction with the exclusive Backus leverage control. **SEE YOUR MACHINERY DEALER OR WRITE TO BACKUS FOR BROCHURE!**

8", 10" & 12" Abrasive and Non-Ferrous Models

BACKUS MACHINE WORKS

Since 1914

ROUTE 17 DEPT. CT CARLSTADT, N. J.

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handling and reduced operator fatigue. Each series is available in straight or lever throttle models, for up to 6" cup wheels and 9" depressed-center wheels. Series 907 is available in speeds from 3100 to 9000 rpm. Series 908 speed choices range from 3100 to 6000 rpm.

Features include direct-acting governors to maintain accurate speed, heavy-duty bearings, 4-bladed swastika-type motors, and hardened, ground, and honed cylinders for long life.

Thomas C. Wilson, Inc., 21-11 44th Ave., Long Island City 1, N.Y.

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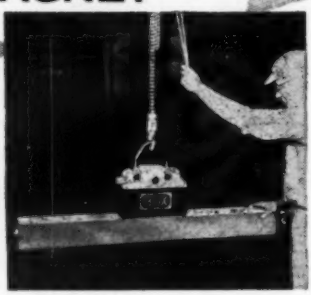
Press Overload Detector Prevents Damage to Dies

An adjustable press overload detector is now available as part of the Dimatic system for preventing damage to dies on power presses, transfer machines and other automated production equipment. The basic electrically

NEW BUX PERMANENT LIFTING MAGNET



RADIAL POSITIONER
Portable Magnetic
DRILL PRESS
Accurate Drill! Positioning FAST!

New positive mechanical-action BUX Radial Positioner assures faster, accurate alignment of Bux portable-magnetic drill presses. Magnetic base remains stationary, safely holding unit to work on any "overhead" or "vertical" flatworking surface. Full 330° positioning-rotation. Lateral movement provided assures precision positioning for drilling, reaming, tapping. Available on Bux magnetic drill press models L-2RP and L-3RP.

FEATURES:

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controlled system, developed by Di-matic Controls, Inc., instantly disengages the press clutch in the event of misfeed, stock buckling, material pile-up, or coil coming to an end.

This new accessory unit will release the clutch solenoid within one cycle following an overload. Sensitivity may be decreased with the increase of the thickness of the material. The unit can be used in conjunction with any basic model Di-matic press control of the 100 or 200 series.

This press control operates on any size press, either friction clutch or mechanical clutch. The device automatically disengages the press clutch should a power failure occur. The unit comes complete with mounting brackets and all external wires.

Di-matic Controls, Inc., 100 Beadel St., Brooklyn 22, N.Y.

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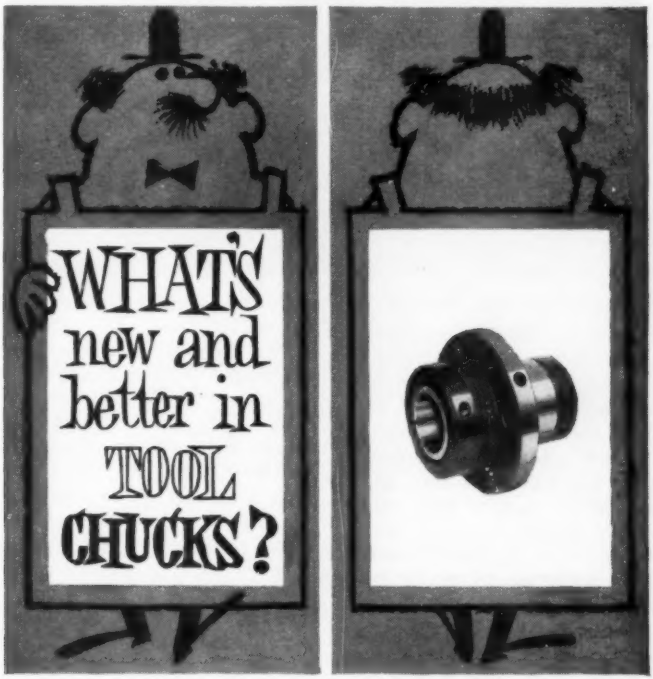

Increased machine running time and longer tool life more than pay for Scully-Jones "Better-Hold" chucks. Give you powerful, self-centering fit—fast! Just twist "lock-and-eject" nut to unseat cutting tool. Reverse twist draws split liner with tapered OD into compression between mating taper on ID of chuck and tool shank. Presetting feature reduces tool-change downtime, eliminates scrap. For complete facts and features write for literature.

SCULLY JONES

Scully-Jones and Company

1907 South Rockwell Street, Chicago 8, Illinois

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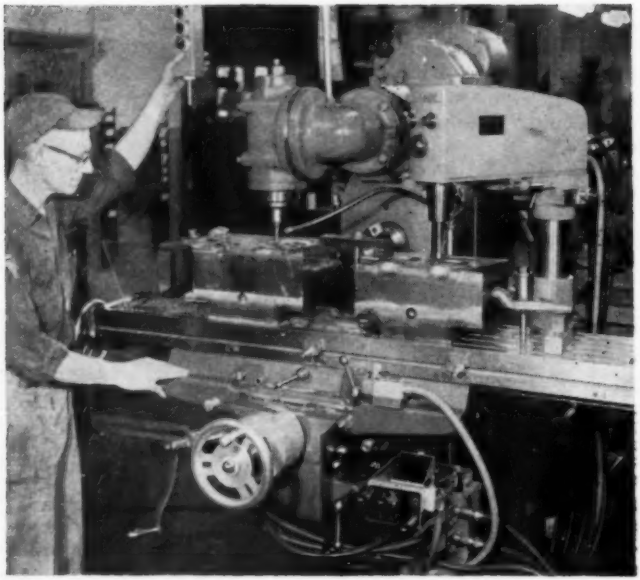

Milling Machine With Tracer

Greaves Machine Tool Co. has a milling machine with a tracing attachment, called a Scan-O-Matic Duplicator; and a universal toolmakers overarm.

It is fully automatic throughout a three-dimensional range, requiring a minimum of operator attention after setup. It can be set to scan with either table or saddle movement, with pick-feeding being done by the opposite movement.

This pick-feeding is infinitely variable, being controlled by a needle valve and an electric interval timer. A hydraulic cylinder and constant-torque, hydraulic motors control knee, table, and saddle movements.

Other features of this drilling machine include: a uniform rate of cutting feed regardless of shape or angle; constant stylus deflection for uniform accurate cuts; automatic shutdown when pre-determined programming has been completed; and a knee control of the sequence of the scanning cycle for work within a cavity or over the surface of a core.

The Greaves Machine Tool Co., 2001 Eastern Ave., Cincinnati 2, Ohio.

Use postpaid card. Circle No. 89

Hydraulic Hose Can Withstand 50,000 lbs. psi. of Pressure

A super-spiral hydraulic hose made by Anchor can withstand a minimum burst pressure of 50,000 lbs. psi. Suitable within temperature ranges of —40°F to 200°F, this hose's construction starts with an oil resistant Neoprene inner tube, covered by an open textile braid reinforcement. Interply friction layers cover six plies of spirally wrapped heavy wire (.022" diameter) reinforcement. A synthetic rubber outer cover resists weather, oil, and abrasions. The spiral wrapped construction permits the use of heavier wire and eliminates the crossing of wires.

It is available from ⅜" to 1½" ID.

Anchor Coupling Co., Inc., Dept. PR-10, 342 N. 4th St., Libertyville, Ill.

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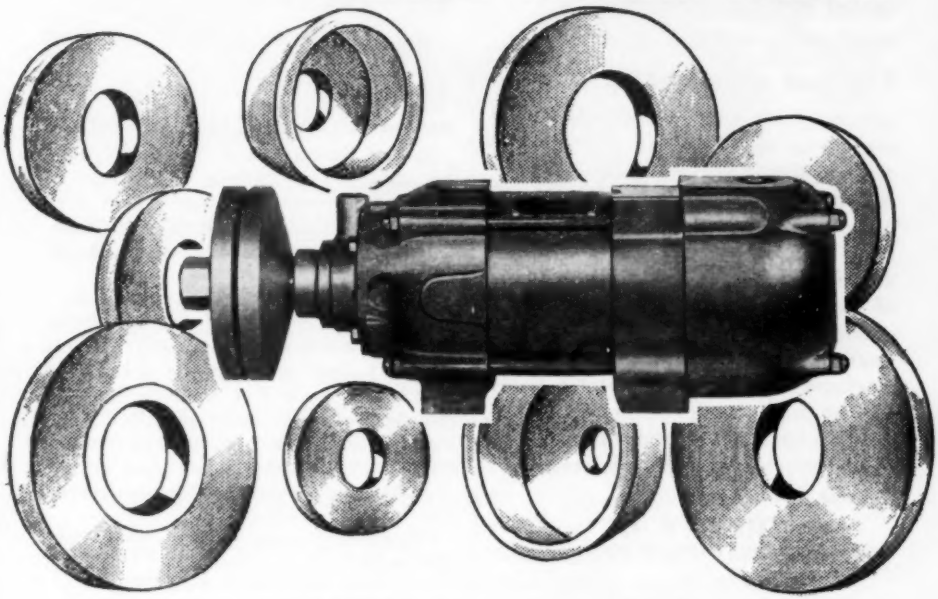
Serving the Industry Since 1852

POSITIVE POWER

with a WOODS MOTOR ARBOR



Precision built WOODS motors are available in a wide variety of types and range from one to one hundred horsepower. Extremely adaptable for use requiring precision balance, a minimum of space and delivering the maximum of power. Why not investigate the advantages of these time-and-money saving motor arbors for your plant today?

Send for descriptive material

MOTOR DIVISION

S. A. WOODS MACHINE CO.

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Clearly explains modern metal cutting—principles, mechanics, machining methods

This book gives vital facts on—

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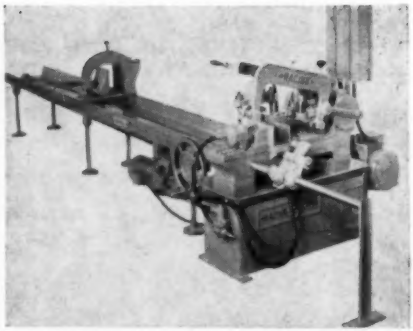

Automatic Cutting-Off Machines

Racine Hydraulics & Machinery, Inc., has added two models to its line of stock feed small automatic metal cutting-off machines. Model 66W2A (illustrated) is a two-speed; and Model 66W4A, a four-speed.

These automatic saws combine hydraulics, electricity, and pneumatics in a simplified form. They will cut all ferrous and non-ferrous metals at speeds up to 140 five-inch strokes per minute. Refeed capacity is 6" x 6".

A length gage incorporates a micrometer screw adjustment that can be set to hold lengths within .005". Ten pieces can be cut automatically.

Racine Hydraulics & Machinery, Inc., 2000 Albert St., Racine, Wis.

Use postpaid card. Circle No. 91

Self-Heating Soldering Tool

Hotspot, a new soldering tool which requires no flame, electricity, or external heat of any kind, is now available from Standard Automation Products. It heats itself by a tiny cartridge located in the tip of the tool. The cartridge is actuated by releasing a spring rod in the handle. Within seconds the tip heats up to 862°F.

The Hotspot can be used anywhere and is available in six interchangeable tip sizes.

Standard Automation Products, 1738 Ridgeway Road, Havertown, Pa.

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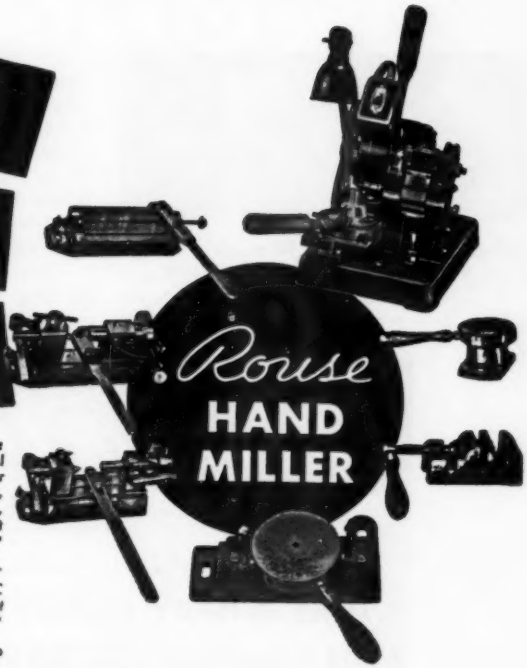

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost
Only $116.00*

Fixtures (illustrated) extra.

*Motor equipment—¼ H.P. 110 Volt AC 60 Cycle, single phase, swivel motor mount and light—$45.00**

**All prices FOB Chicago*

★ **MILLS SMALL PARTS MUCH FASTER.**

★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.

★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.

★ **NO MORE COSTLY SET-UP TIME. $116.00** price so low that it pays to keep one or more Hand Millers always set-up for special operations.

★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.

★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.

★ **VERY LOW MAINTENANCE.**

★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.

★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of *your* production problems.

Write today for further information

H. B. ROUSE & COMPANY
2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

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Sine-Line Sets Up Machine For Angle and Taper Cutting

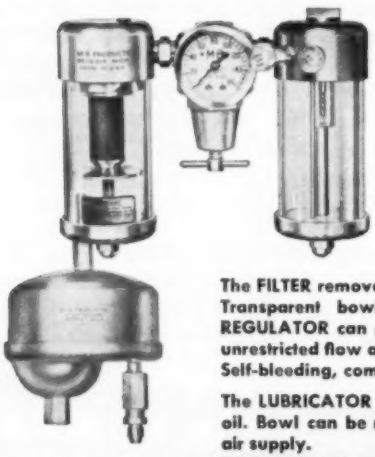
A new tool called Sine-Line sets up almost any type of machine to cut any angle or taper, thereby saving setup time and scrap, and eliminating plug making. It works on lathes, shapers, horizontal or vertical mills, interior and exterior grinders, cutter grinders, surface grinders, and is unmatched for surface plate, inspection work, and jig borers. It can also be used to straighten the machine.

This tool holds its own gage blocks in any position without extra clamps or angle plates through the use of a

GREATER PROTECTION to your AIR LINE!

M-B

WHIRL-A-WAY FILTER, REGULATOR AND LUBRICATOR ASSEMBLY AND AUTOMATIC AIR TRAP (MODEL W-4)



SUCCESSFULLY USED FOR PROTECTION OF AIR VALVES CYLINDERS CONTROLS PNEUMATIC TOOLS, ETC.

The FILTER removes solids .00039 and larger. Transparent bowl provides visibility. The REGULATOR can pass large volume with an unrestricted flow and minimum pressure drop. Self-bleeding, compact.

The LUBRICATOR delivers desired volume of oil. Bowl can be refilled without shutting off air supply.

The Air Trap is automatic and eliminates manual draining.

M-B PRODUCTS
46 VICTOR AVE., Div. 12
DETROIT 3, MICHIGAN

Use postpaid card. Circle No. 298

tension plate and spring assembly. It has lapped centers for center mounting; ground diameters at both ends for collets, chucks, and vises; and a separate ground and lapped mounting base for upright work. The ground ends are used to steady upright work, rather than for locating.

Armstrong-Schramm Co., P.O. Box 322, Muncie, Ind.

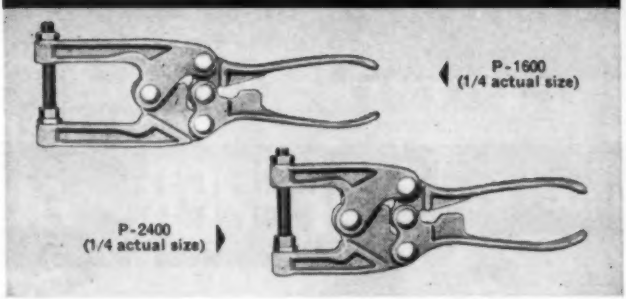
Use postpaid card. Circle No. 93

Chuck Closes Collets Without Stopping Spindle

Instant closing and releasing of flexible rubber collet chucks without stopping the spindle is now possible with the Airflex collet actuator. The complete unit, containing the actuator cylinder, the spindle sleeve, and nose piece, threads onto any 2¼" x 8" threaded lathe spindle without machine alterations.

continued

Another step forward
***KNU-VISE* TOGGLE PLIERS with**
1600 & 2400 lbs. clamping force



In keeping with its reputation for providing the industry's most efficient toggle clamps and pliers, Lapeer Manufacturing Company has introduced new plier models—the P-1600 and P-2400 series.

Long and comfortable handles are a feature of these Lapeer Knu-Vise pliers. With average handload, these pliers provide a clamping force of 1600 and 2400 lbs. respectively. The P-1600 series has a throat depth of 2¼", and throat gaps of 1⅜, 3, 4 and 6 inches. The P-2400 series has a throat of 1¼" x 1¼". Each series is available with two opposing spindles. All models can be furnished with unlocking levers. The pliers are made from steel forgings, heat-treated, and cadmium plated.

Write for more information and remember—LAPEER KNU-VISE GIVES YOU MORE VALUE FOR YOUR MONEY.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

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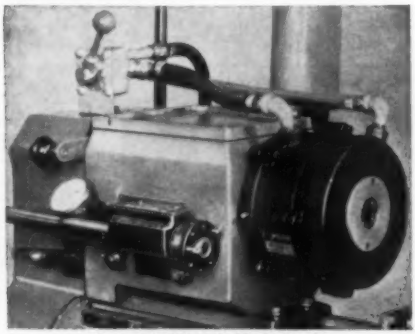
WESTERN DIV.: PECK and LEWIS CORPORATION
4438 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7146
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.
1131 Pettit Road, Burlington, Ontario

Use postpaid card. Circle No. 299

Collet Closer, continued

It produces a grip 22 times greater than air line pressure with a ¼" stroke. Positive length control is obtained by using a fixed stop in the hollow spindle. Since no actuator bar is required, full 1⅜" spindle capacity is available for feeding bar stock or for rapid ejection equipment. Over-all measurements are 7" OD x 4" long.

Wil-Numat Corp., 411 S. Hindry, Inglewood 1, Calif.



Use postpaid card. Circle No. 94

225 Amp Welder

The Lincoln Electric Co. has developed a 225 amp AC transformer-type arc welder offering metalworking shops output capacity and variety of electrode selection formerly available only in larger industrial models. This unit, the company states, fills the need for welder performance between high capacity production welding equipment and small 180 amp shop machines.

Dial-type current control provides adjustment and setting of the welder over an amperage range from 40 to 225. Electrodes from the smallest to 3/16" diameter can be used to weld material of any thickness.

Other features include a voltage input adjustment to insure full output performance under all power supply conditions, permanent cable connections for trouble-free operation, and industrial-type weatherproof construction.

The Lincoln Electric Co., Cleveland 17, Ohio.

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Make cuts DEEPER and FASTER

ROOFE Live Centers, praised by users everywhere, are made of finest materials under rigid quality controls.

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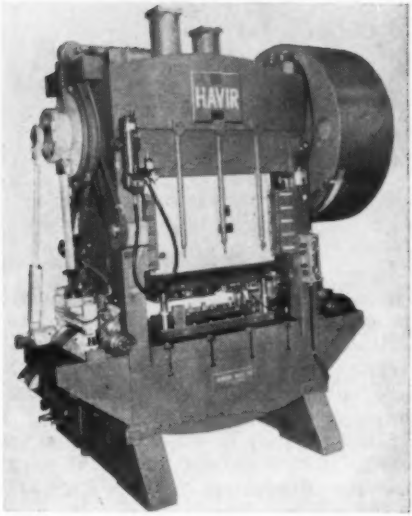


150-Ton Auto-Press

Increased press and die life are claimed for the heavy-duty 150-ton Havir Auto-press. This high-speed equipment has a cylinder-type ram for precision alignment and maximum rigidity.

The press stops automatically in the event of a die jam or misfeed. Standard speeds are 70 to 210 spm using an 18" wide feed. The air-clamped feed prevents stock distortion and allows control of roller pressure. Slower speeds, and single or double feeds are available as optional equipment.

It comes equipped with a variable speed 20 hp motor.

Havir Mfg. Co., 444 N. Cleveland Ave., St. Paul, Minn.

Use postpaid card. Circle No. 134

Vertical Processing Machine For Small Wire and Stripping

The V-80 vertical metal processing machine announced by Torrington Mfg. Co. is designed specifically for high-speed production of small wire and strip components with unusually low

make hundreds of bends

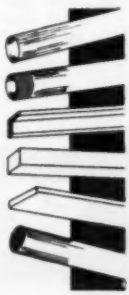
(simple–tough–complex★) with a

HOSSFELD UNIVERSAL* IRON BENDER

★ The versatile Hossfeld Universal Bender makes hundreds of bends in round, flat or square bar stock, angle iron, pipe, tubing and conduit. It's invaluable for maintenance, limited production work.

Over 150 Standard Dies

are available to reproduce any everyday bend. This versatile Hossfeld bender sets up quickly, and is wrenchless for ready use.



3 MODELS: Hossfeld No. 1 for light shop work, No. 2 for heavier work, No. 2 with hydraulic attachment for tough hard-to-pull bends on heavy material.

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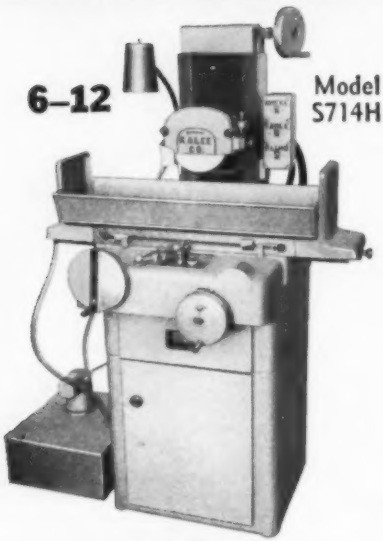
SURFACE GRINDER

6–12 Model S714H



features:

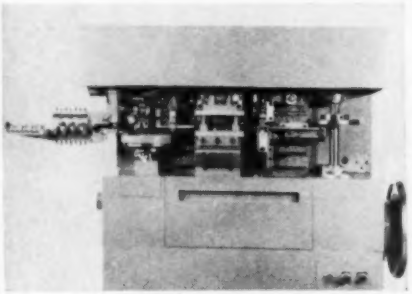
- ★ Spindle has duplex pre-loaded heavy duty ball bearings on each end. Spindle is driven with O-ring type belts for smooth operation.
- ★ Heavy cast iron construction throughout.
- ★ Extra length V and flat table ways distribute weight over greatest practical area for maximum table support and permanent accuracy.
- ★ Automatic oiling system. Ways are continuously lubricated.
- ★ Manual or hydraulic models available.
- ★ Cross feed hand wheel graduation .001", vertical hand wheel graduation .0001". Both can be instantly reset to zero or any other desired graduation.

Produces a finish equal to that of the highest priced surface grinders.

WRITE FOR COMPLETE LITERATURE

K. O. LEE COMPANY, ABERDEEN, SOUTH DAKOTA

K.O. LEE CO.



setup time. Because of the modular design, this machine can be adapted to add welding, tapping, swaging, thread-rolling, and other secondary operations automatically within or parallel to the primary forming cycle.

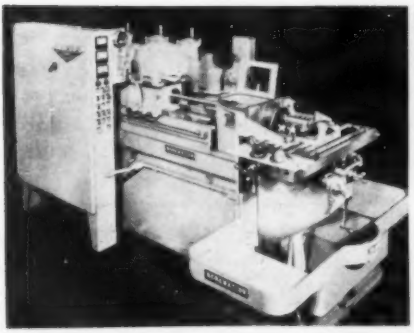
Stock capacity is ¾" maximum strip width, .032" thickness, and 1/16" wire diameter. Production rates are from 100 to 500 spm with standard rise cams, and 100 to 350 with either maximum rise cams or feed lengths near the maximum.

Machine division, Torrington Mfg. Co., Torrington, Conn.

Use postpaid card. Circle No. 135

Electron System Eliminates Gun-Drill Breakage

The Monitor Controlled Boremation gun-drilling machine is an electronic system designed by Drillmation Co., Inc., to remove guesswork from deep-hole or gun drilling. Since almost all deep-hole drilling problems occur at the cutting edge of the tool deep in the hole, this system remedies the situation by monitoring each danger area during the drilling cycle. Any deviation from a smooth normal drilling operation immediately incites the system into action, automatically stop-



ping the feed before the workpiece, tool, or machine can be damaged.

Dials pinpoint the cause of the malfunction making it possible to start corrective measures immediately, thereby keeping downtime to a minimum.

Drillmation Co., Inc., 6500 E. 11 Mile Road, Center Line, Mich.

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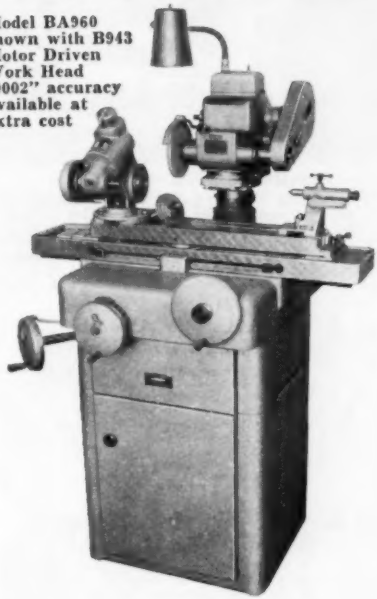
"But it was such a LITTLE mistake!"

UNIVERSAL GRINDER

Model BA960 shown with B943 Motor Driven Work Head .0002" accuracy available at extra cost



features:

- ★ Cross feed 7⅜", table traverse 14"
- ★ Grinding head speeds 3450 to 20,700 RPM
- ★ Wheel head swivel full 360°
- ★ Two-speed transmissions
- ★ Heavy duty cast iron base
- ★ Maximum swing over center 10¼" with 1" raising blocks
- ★ Resetable dials on vertical and cross feed handwheels

For complete information, write for Grinder Catalog TG-1 which lists other models and fixtures.

K. O. LEE COMPANY, ABERDEEN, SOUTH DAKOTA

GRINDERS

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Three Machines in One

A 3" horizontal boring, milling, and drilling machine with a 40' bed and a 20' table has been introduced by S & S Machinery. Called a Supermill, it consists of a 3" horizontal boring, milling, and drilling headstock and column

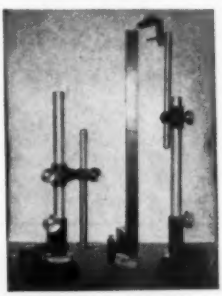
"You may not agree with what I say, but I'll defend to the death my right to say it!"

New *American Standard's*

PRECISION SURFACE GAGE

PATENT PENDING

The exceptionally smooth fine adjustment is in a vertical plane and all backlash is virtually eliminated. Working range is from Zero to 20" in height. With the use of an extension rod any height may be measured.
A sturdy well built tool. Weight 6 lbs. Even extended to 20" in height, you will be able to work with confidence and repetition with a .0001 Indicator.



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with pendant controls to operate feed and rapid traverse to the headstock. A 40′ bed and 20′ table with separate drive operate through electronics thyratron and pendant controls. Building block design provides variations in table and bed lengths and column height.

The 20′ table rides on special edge grained plastic inserts to reduce friction and is operated by separate thyratron controls. The spindle is supported in Timken bearings and the tailstock for the bar by Torrington needle bearings.

S & S Machinery Co., 140 53rd St., Brooklyn 32, N.Y.

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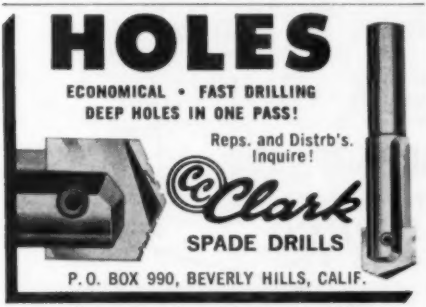
Polishing Machine

An automatic polishing machine announced by Yates-American is a high-



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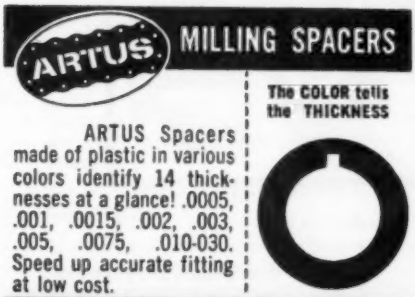
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Timken Bearing Column & Spindle
Head Glides on Ball Bearing Rollers
Send for Brochure of Veet's 16 Points of superiority and name of nearest dealer for demonstration.
Mfrs. of the VEETMATIC Precision Drilling Machine with Numerical Control and the VEET SPEEDMILLER for Planer Conversion.
MFGD BY Veet INDUSTRIES EAST DETROIT MICH.

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production unit designed for producing superior finishes on sheet materials. The polishing operation is accomplished with an oscillating and rotating wheel drum made of abrasive impregnated nylon. This drum is positioned over the work for maximum ease of adjustment, and can be removed for changing rate or renewing the abrasive. Lowering and raising of the drum by an actuated air cylinder is controlled by an automatic sensing device.

Two models accommodate widths up

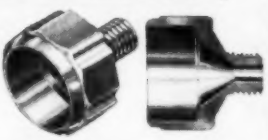
TOWNSEND OF HARTFORD

QUALI-MATIC MACHINES

ONE Townsend Automatic
effects a
3 WAY SAVING

Performs 4 operations *automatically*

The Townsend Special Drilling Machine mass produces 1200 oilmeter and ammeter switch housings per hour. One machine turns, faces, deburrs, drills . . . performs four separate operations to close tolerances (plus or minus .001).



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SAVES manpower costs! SAVES on machinery costs!

The H. P. TOWNSEND MANUFACTURING CO.
99 Brook St., West Hartford 10, Conn.

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to 51" and 61" in thicknesses of 3".
Yates-American, Beloit, Wis.

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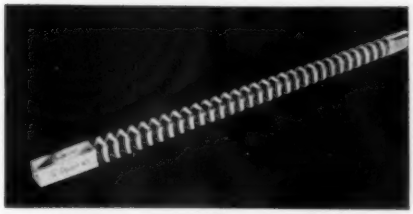
Square Broaches For Arbor Presses

Two square broaches have been added to the du Mont "Minute Man" line. Both are used in an arbor press. One (illustrated) finishes a square hole to exact size in a drilled, reamed, or cast bore in one pass. The other, discussed in May BB on p. 179, is for cutting a keyway.



The new sizes, ⅞" and 1" square, extend the standard sizes available to nineteen ranging from ⅛" to 1" square.

The du Mont Corp., Greenfield, Mass.

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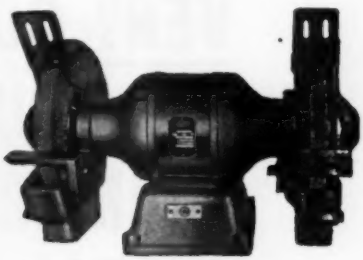
makes tough grinding jobs *Easy!*

BALDOR

MODEL 183—10"

Rugged! Every part oversize to give years of dependable, trouble-free service—even on the most difficult grinding jobs. Ideal for use on large, odd-shaped pieces. Other outstanding features include:

- **Rugged ¾ HP Baldor motor won't burnout even if repeatedly overloaded!**
- **Big ⅞" arbor . . . extra large ball-bearings!**
- **Wide-clearance construction provides more working room!**
- **Dynamically-balanced rotor plus patented wheel balancing process, reduce vibration to a minimum!**
- **Big 10" fast-cutting, long-lasting wheels!**



One H.P.—single phase or three phase—$162.00

CARBIDE TOOL GRINDER

Model 153—6", Reversible ½ HP motor, 3450 RPM. 1½" wide wheels. Every part oversize for rugged, long-lasting use. Just $201.t

Write today for Bulletin 321P on complete line of Baldor Grinders and Buffers!

BALDOR ELECTRIC CO.

4353 DUNCAN AVE. ST. LOUIS 10, MO.

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Quick-Acting Pressure Clamp

The Universal Vise & Tool Co. has announced a quick-acting pressure unit for use as a clamping component in jigs, fixtures, and other tooling and special clamping operations. This unit has push-pull lock and release.

A simple twist of the handle unlocks, a quick turn clamps the work. Standard units are suitable for clamping ranges up to 8". The bar is furnished with a plain soft end machining and adapting to any application.

The mounting block is of compact size to allow mounting in close spaces.

GOOD ON YOUR LATHES...

VERY GOOD FOR YOUR TURNING COSTS

Multi-Duty models for light work and general use. Rigid, accurate. Interchangeable male, female and pipe points.

ACCURATE

IDEAL LIVE CENTERS

4 complete lines. Over 40 sizes and styles.
All popular tapers for heaviest to lightest work.

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Sold through Leading Industrial Distributors

In Canada: IRVING SMITH, Ltd., Montreal

IDEAL INDUSTRIES, Inc.
1441-G Park Avenue
Sycamore, Illinois

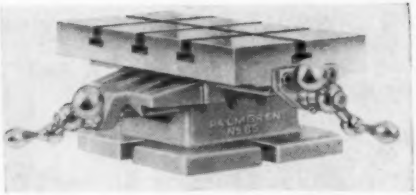
Use postpaid card. Circle No. 312

Universal Vise & Tool Co., Parma, Michigan.

Use postpaid card. Circle No. 140

Dual Cross-Slide Milling Table

A dual cross-slide milling table has been added to the line of work holding devices made by Palmgren Steel Products. Called the No. 85, it can be furnished with 10" x 6", or 12" x 6" table top surface. Either size has one longitudinal tee slot and three equally



spaced cross slots. Transverse travel is 4½" and longitudinal travel is 6".

Balance cranks are removable. The square base has four mounting lugs and

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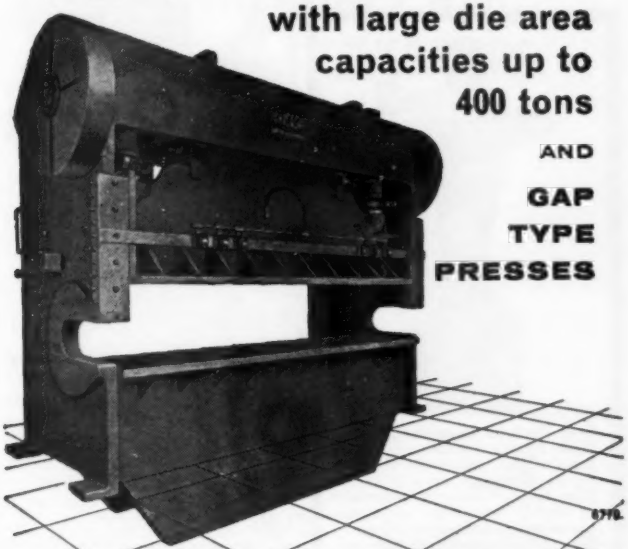
STRAIGHT-SIDE TYPE

with large die area capacities up to 400 tons

AND

GAP TYPE PRESSES



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DREIS & KRUMP MANUFACTURING CO.

7440 South Loomis Boulevard, Chicago 36, Illinois

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5/8" keys and keyways for machine slot mounting.

Palmgren Steel Products, 8383 S. Chicago Ave., Chicago 17, Ill.

Use postpaid card. Circle No. 141

Tire-Shaped Flexing Element On Heavy-Duty Cushion Coupling

A heavy-duty flexible cushion coupling has been announced by Dodge Mfg. Corp. Named the PX280 Paraflex, it features a standard tire-shaped flexing element to accommodate angular and parallel shaft misalignment, and to absorb end float, shock, and vibration, it will handle 400 hp per 100 rpm. It's capacity at maximum recommended speed is 3640 hp.

The coupling is available from stock with Taper-Lock bushings for shafts up to 7" in diameter, or it can be ordered bored-to-size for shafts as large as 9".

Dodge Mfg. Corp., Mishawaka, Ind.

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TORIT

Torit Cyclone Separator Model. High efficiency collection of all types of dust, chips and shavings. Up to 95% of the dust is removed from the air, drawn into the top of cone by centrifugal force, and settled to the dust reservoir below. Clean air is exhausted outside the building or indoors through after filters.

Self contained, compact, portable steel units. End mounted motor and blower mounted in free air for cool operation, is detachable for servicing or relocation of outlet. Cones can be rotated for proper inlet location. Dust reservoir has pull-out drawer for easy cleaning. Individual capacities range up to 6500 cubic feet per minute. Larger units are built on special order.

Prices start at $335.

DUST COLLECTORS STOP LOSSES CAUSED BY DUST

- *machine wear*
- *absenteeism*
- *product damage*

With a Torit Dust Collector, machines stay clean, hold close tolerance up to 80% longer. Dust is kept off bedways, slides, and bearing surfaces. There are fewer accidents because work areas are clean and safe. Employees work more efficiently in clean air, their health protected. And there is no dust in the air to harm fine product finishes.

* For a FREE handbook detailing specifications and performance data of Torit Dust Collectors and applications, write Dept. 650.

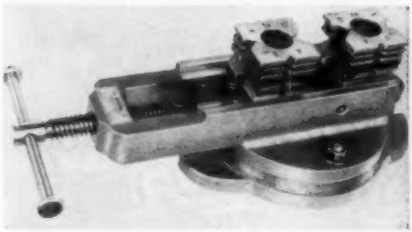
TORIT
MANUFACTURING CO.
1133 Rankin St. • St. Paul 16, Minn.

Use postpaid card. Circle No. 314

Versatile Super Vise

A Super Vise with multiform profiles ground into the hardened tool-steel jaws to grip a variety of shaped materials has been developed by C. H. Stoelting Co. The jaws can be positioned to hold rounds, squares, flats, rectangles, angles, tees, or tubing. This vise is claimed to hold thin-wall tubing without distortion.

The main body is machined from solid alloy-steel plate and heat-treated.



C. H. Stoelting Co., Chicago, Ill.

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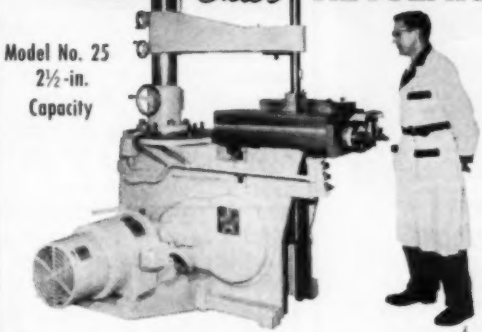
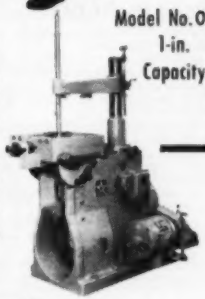
MAKE PRECISION KEYWAYS with Star KEYSEATERS





Versatile, heavy-duty Star machines produce precision keyways in a minimum of time. Proven overarm bushing support and motorized pull-down reciprocating cutter bar action assures maximum keyway accuracy and alignment. Wedge-locked H.S.S. form tools in stock sizes from 1/8-in. to 3-in. width fit seven standard bar sizes up to 2-7/16-in. diameter. Stroke adjustable up to 24-inches. Automatic work table feed and backoff. Tilting table. Overarm column movable for cutting keyways opposite spokes.

Star Cutter Company

34500 Grand River Blvd. • Farmington, Michigan

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Our years of accumulated GUN DRILL making experience and knowledge, plus a complete research and engineering department are yours to take advantage of.

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- The world's largest manufacturer of GUN DRILLS—exclusively.
- A complete choice of sizes, lengths, types.
- Eliminate secondary operations—reaming, honing, grinding.
- Save your company money by reducing "cost-per-hole."
- Drill most materials—aluminum, cast iron, brass, tool steel, stainless, etc.
- Drill any shaped part to any depth (sometimes interrupted holes or across existing holes).
- Drill shallow or deep holes to precision tolerances.

Since these extras cost you no more... your best bet is an ELDORADO GUN DRILL

ELDORADO specialized engineers, backed by research facilities are available to assist you on special 'HOLE' problems. **WRITE TODAY!**

ELDORADO TOOL & mfg. corp.

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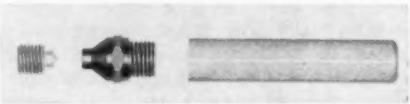
Rapid Transfer Screws

Kay Products Co. announces a line of rapid transfer screws in sizes from No. 4 to 1" in both NC and NF threads.



These screws have uniformly machined points and are heat-treated for longer life.

Kay Products Co., Springboro, Ohio.

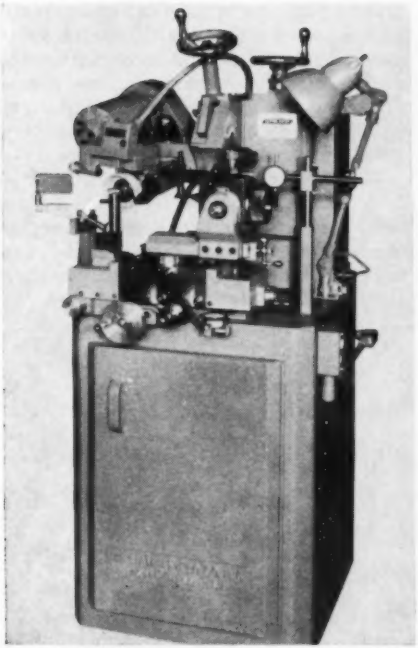
Use postpaid card. Circle No. 144

End Mill Cutter Grinder

An end mill grinder that incorporates a simplified system for grinding eccentric or radial relief on end mills and milling cutters having helical teeth has been developed by William H. Field Co. Mechanical wheel dressing is performed by three separate interrelated diamond wheel dressers.

Features include a compound angular wheel head with a 50° clearance angle

"I don't understand you, Clarence—I've worked here twenty years, and I've never had any complaints!"



adjustment and a 15° contact angle adjustment; a work head with a rapid indexing mechanism and a 2" hole through the spindle providing a collet capacity of 1¾"; an optical parallel gage for setting the teeth of non-radial cutters into indexing position; and a wheel head column with a 7" lateral adjustment to allow the carriage travel to be used for actual grinding capacity.

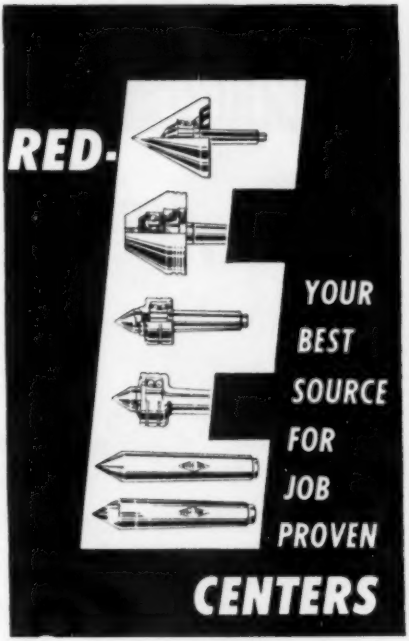
The rotation of the grinding wheel spindle is reversible for operation in either direction.

William H. Field Co., Inc., 323 Dorchester Ave., Boston 27, Mass.

Use postpaid card. Circle No. 145

Compact Universal Machine For Drilling and Tapping

Jarvis Corp. has introduced a universal drilling and tapping machine which is completely self-contained and compact (66" high including base). It is designed primarily for small parts



Choose from over 250 types, tapers and sizes. Anti-friction or Solids.

Here, illustrated, are but a few of the many RED-E Centers. It's a safe bet READY has the right CENTER for your job, whether it be on a lathe, grinder, miller, spinning, screw or gear cutting machine.

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360 Florence Avenue Hillside, N. J.

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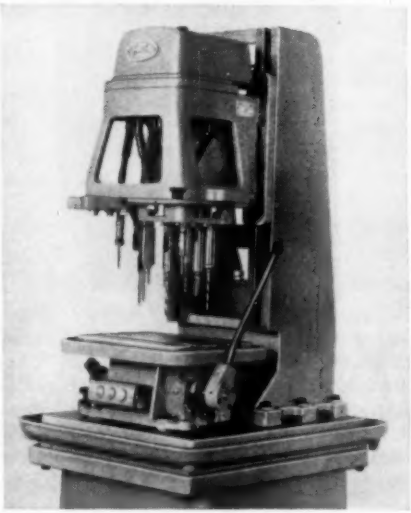
production where small-hole drilling and tapping are required. The standard unit comes equipped with twelve spindle drivers and is able to obtain center distances to ⅜" minimum. Close center distances are available with variations of the basic spindles. Work area of standard model is 6" x 8¼".

This machine has a vertical-feed table that brings the work up to the head rather than the head coming to the work. The unit is powered by a heavy-duty motor through a vee-belt drive allowing four speed changes.

Jarvis Corp., Middletown, Conn.

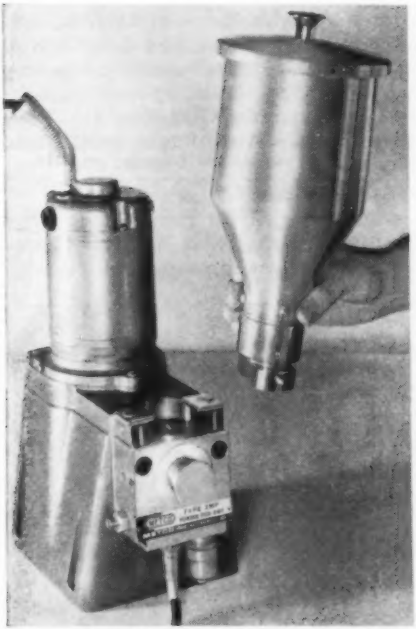


Use postpaid card. Circle No. 146

Powder Feed Unit

A unit that has been designed to feed powder to the gun at a constant rate by means of a positive metering device has been introduced by Metco Inc. A gas stream carries powder to the gun without flutter. Volume is controlled by a single knob.

The powder is fed from a hopper which holds approximately 1 hr. of spray time of powder. The unit is open to the atmosphere and refillable while



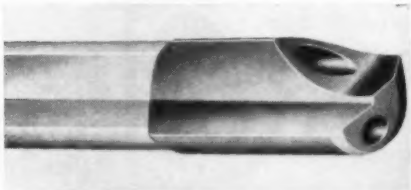
the gun is in use. It contains a non-split valve assembly which operates automatically when the hopper is removed. The feeder mechanism is cleaned by running without the hopper in position.

Metco Inc., 1101 Prospect Ave., Westbury, L. I., N.Y.

Use postpaid card. Circle No. 147

Double-Jet Gun Drill

A single-flute carbide gun drill that has two holes for cutting fluid flow instead of the normal single hole has been developed by Star Cutter Co. Called the Star double-jet gun drill, this device increases and directs the



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- —attaches to existing shop airline
- —shatter-proof 8 oz. reservoir
- —neoprene flexible coolant line
- —magnetic nozzle holder positions anywhere
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TRICO FUSE MFG. CO.
MILWAUKEE, WIS. U.S.A.

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flow of cutting fluid to the cutting edges of the tool. It is claimed to increase life between sharpenings up to three times that of conventional single-hole models.

This gun drill has one hole in the top of the tip above the cutting edge that directs cutting fluid at the edge. The other hole, which is in a conventional location, provides the chip ejection.

It is available in sizes of 3/16" diameter and up in specified lengths, and has a molded solid carbide tip brazed on the end of a formed steel tube.

Star Cutter Co., P.O. Box 376, 34500 Grand River Ave., Farmington, Mich.

Use postpaid card. Circle No. 148

Tool Presetting Machine

A tool presetting machine, designed to preset cutting tools to rigidly accurate tooling requirements of numeri-

Patent No. 2,884,038
Won't Shake Loose-EVER!
Patent No. 2,923,340
Blue Devil®
LED-LOK® SAF-LOK®
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cally controlled machine tools, has been developed by DeVlieg Machine Co. This machine enables cutting tools to be preset for both diameters and depth to precise tolerances, handling boring bars, milling cutters, drills, and other accessory tooling.

The unit is 46" long, 44" wide, and 50" high. It includes a surface plate area on top of the 24 x 36" base, and offers a tool setting capacity of 8" diameter maximum. It has a maximum depth of 18" (from gage line in the taper socket).

It consists of a precision presetting spindle mounted on the base and arranged with transverse and longitudinal slide adjustments.

A Bausch & Lomb 40-power illuminated microscope with special cross

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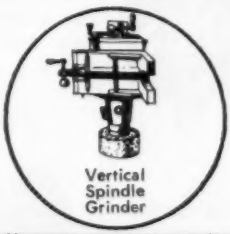

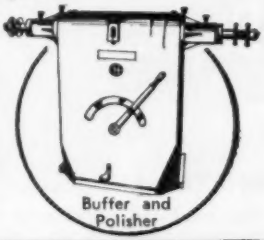

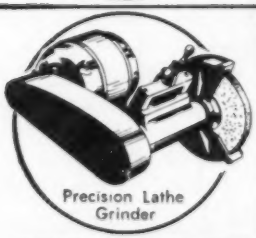

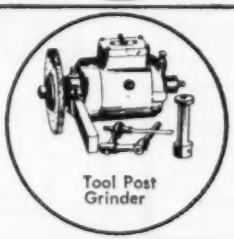

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Capacity: 6" x 6" (7" x 6" Special)
1 to 1 ratio with master

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Write for literature to National Distributor
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1575 Railroad Avenue, Bridgeport 5, Conn.

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hair reticule is mounted on the slides for optical sighting of the tool point.

Microbore division, DeVlieg Machine Co., Royal Oak, Mich.

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Three-Jaw Positioner

This three-jaw, self-centering positioner has a capacity from 3" to 40". The manufacturer describes this as a fast, accurate positioning device for

"Did I leave my wrench here when I came back for my gage?"

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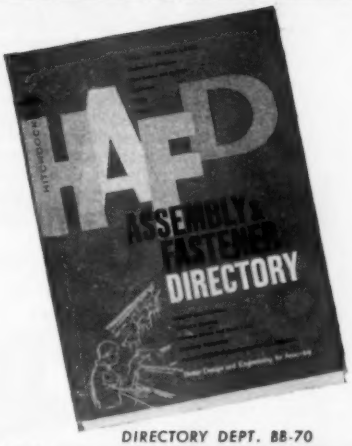
Valuable engineering data on standards, finishes, strength of joints, torque, materials and other subjects will be included in tables and chart form.

A special trade name section will list products commonly known by their trade names, describe the products and identify the manufacturer. Another section on associations will contain an up-to-date list of important trade and professional groups serving the industry.

The Directory will be bound in hard covers, measures 8½ x 11½ inches, and is planned to answer many questions with which you are confronted in day-to-day assembly problems.

Reserve your copy now at the special pre-publication price of $7.50, $2.50 under the $10.00 cost at publication. Early orders are assured the first copies off the press in September. Be sure to take advantage of this pre-publication savings and reserve your copy with the handy coupon at the right.



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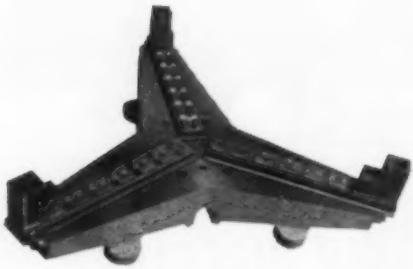

such applications as welding and flame hardening. Hardened steel jaws open and close at a turn of a wrench and work is automatically centered.

The holding device mounts on headstock, turntable, or positioner, and can be fitted with soft jaws for special applications. It is sealed against dirt and abrasive materials.

Skinner-Horton Chuck division, New Britain, Conn.

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Ball bearing thrust on worm shaft and rear end of spindle.
Headstock spindle has threaded nose.
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Worm wheel and worm shaft can be fully disengaged.
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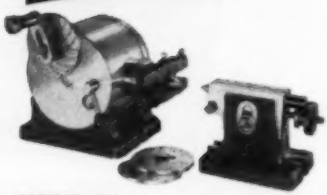

MODEL SD 6½" Swing. Spindle threaded 1½"-8. ⅝" table slot tongues. 36 lbs. **$175.00**

MODEL BP 11" Swing for plain milling machines. Spindle threaded 2¼"-10. ⅝" table slot tongues. 140 lbs. **$295.00**

MODEL AU 11" Swing. Fully universal for complete indexing and spiral cutting. Spindle threaded 2¼"-10. ⅝" table slot tongues. 190 lbs. **$460.00**

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Tapered End Mills

High-speed steel tapered end mills have been added to the cutting tool line of Fastcut Tool Co. They are used as die-sinking cutters and also for angle or pocket milling. These mills are three-fluted, with straight shanks. Taper ranges from ½ to 7° per side. Small end diameters are from 3/32 to 1/2". Right-hand cut and right-hand spiral are standard. Left-hand cut or spiral are available on special order.

Fastcut Tool Co., 25425 Mound Road, P.O. Box 395, Warren, Mich.

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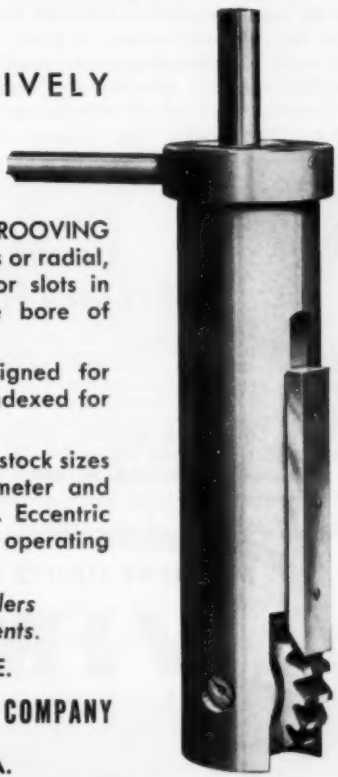
MILL KEYSEATS OIL GROOVES

QUICKLY ÷ INEXPENSIVELY



NATIONAL KEYSEATING OR OIL GROOVING MILLERS—when chucked in a drill press or radial, mills accurate keyways, oil grooves or slots in one pass of the miller through the bore of work piece.

NATIONAL millers are also designed for milling in BLIND holes. They can be indexed for milling opposite or multiple splines.

NATIONAL millers are available in stock sizes for bores from ½" to 3½" in diameter and with cutter widths from 3/32" to 1". Eccentric bushings are available to increase the operating range of each miller.

Keyseating or Oilgrooving Millers built to your special requirements.

WRITE FOR FREE BROCHURE.

NATIONAL MACHINE TOOL COMPANY

P.O. Box 92, Station 'B'.
CINCINNATI 22, OHIO, U.S.A.

Use postpaid card. Circle No. 326

Comparator Checks Masters

An electronic comparator that checks master rings and discs to an accuracy within .000002" is announced by Federal Products Corp. This comparator can measure inside diameters from .040" to 4.760", and outside diameters from 0" to 3.5". These measurements are made with a constant gaging pressure, since the contacts are mounted on a free-floating unit which eliminates all friction. Two scales are immediately available by switching. They are 11,200X magnification (.000010" grads.) and 2200X magnification (.000050" grads.)

The amplifier is transistorized and battery powered. When not required full time for check masters, the portable amplifier can be used with an electronic gage head for other measuring applications.

Federal Products Corp., Providence 1, Rhode Island.

Use postpaid card. Circle No. 152

Battley Disc Accessory

E. W. Pike & Co., Inc., has announced its battley disc accessory for fine inspection and identification work. It fits the bottom housing of the company's 5X and 7X line of illuminated magnifiers. It has a series of concentric circles for fine inspection.

The magnifier unit can be used to inspect metals and metal products,

Make 3 hammers AT ONCE!

It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

Write for circular and prices

COMPLETE LEAD HAMMER SERVICE

COOK LEAD HAMMER SERVICE
67 MASSASOIT AVE., EAST PROVIDENCE, R. I.

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TAP BUSHINGS

Drives all standard taps from No. 0 to 1⅝" and pipe taps from ⅛" to 1" Five o.d. sizes.

LESS TAP BREAKAGE

LESS TAP WEAR

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BYCO INDUSTRIES
2201 Snelling Ave. Minneapolis, Minn.

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UL LISTED

MACHINE LIGHTS FOR INCREASED PRODUCTION

VIMCO Lights SINCE 1919

Eliminate eyestrain inaccuracies, rejects, and safety hazards. Increase output with on-the-spot lights. No resetting, instantly adjustable ...and stays put! Custom design or 6 standard models. Send for Folder 85.

VIMCO MFG. CO., INC.
300 MAIN ST., HOLLAND, N. Y.

Use postpaid card. Circle No. 329

paints and finishes, labels, stamps, maps, and photo engravings.

E. W. Pike & Co., Inc., 711 Pennsylvania Ave., Elizabeth, N.J.

Use postpaid card. Circle No. 153

Optical Polygon Indexing Device

Optically checking alignment and angular spacing in any multiple of full degrees can now be done with this 360 sided optical polygon. Called a Milichex MOX 3600 by its developer, Michigan Tool Co., Detroit, it is a compact indexing device with an optical mirror mounted on its rim. This device is accurate to within 0.000012" at a 20" diameter.

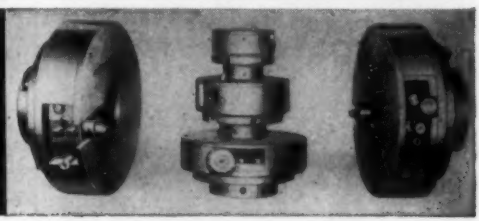
When used with an autocollimator or similar sighting equipment, this optical polygon provides an accurate mirror surface which reflects the projected image of the sighting device's cross hairs. The amount of deviation between

the reflected image and the graduated cross hairs in the sighting device gives a geometric check on misalignment, parallelism, and angularity. Measurement is in 1° increments.

Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Michigan.

Use postpaid card. Circle No. 154

MUMMERT-DIXON
FACING HEADS



IMPROVE FACING OPERATIONS On Boring Mills, Drills, Lathes, Millers And Radials

One-way and two-way automatic tool feed. Bit travels radially from center outward or reverse. 10 sizes, 6" to 46" dia. Also combination hydraulic Boring and Facing Heads, and "Buldog" Boring Heads.

PEERLESS Tools for Motor Repair Shops

Self-Contained Gear-Driven Radial Grinders

Swing Frame Grinders Oil Stone Grinders

MD

MUMMERT-DIXON COMPANY

126 Philadelphia St., Hanover, Penna.

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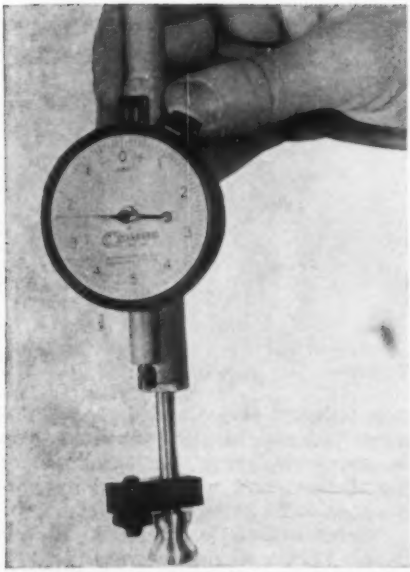

Retractor Permits AGD Accuracy

Standard Gage Co. has a "retractor" indicator which permits AGD accuracy on most any application that would normally require a less accurate "long range" model indicator. It can be used on shallow-diameter gages to check O.D. or I.D. undercuts or recesses; on a dial snap gage frame to check external gear or spline P.D.'s; as a modified dial pin gage to check extra deep or narrow I.D. grooves; and on a comparator base to check wall thickness at the bottom of a deep cavity.

Standard Gage Co., Inc., Poughkeepsie, New York.

Use postpaid card. Circle No. 155

Loader for Slender Parts

An automatic device which loads, locates, and unloads long slender parts in production machines has been designed by Michigan Tool Co. Its purpose

JIG GRINDING and JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N. J.

Telephone: ADams 2-7300 Digby 9-1445, N.Y.C.

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Supply your machinists with

TAHLEN NO-BOUNCE HAMMERS

CONTROLLED BLOW PROFITS are yours with TAHLENS

REPLACEABLE TENITE OR NYLON TIPPED

6-oz. 7/8" face | 1-lb. 1¼" face | 2-lb. 1¾" face | 3-lb. 2⅛" face

IMPERIAL CAST STEEL CONVEX FACED

1¼-lb. 3/8" face | 2-lb. 1¾" face | 3-lb. 2" face

WRITE for folder, prices and nearest Distributor

Dept. M-7 TAHLEN HAMMER CO.

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AUTOM TRADE MARK

Plain Type

Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET

AUTO MOULDING & MFG. CO.

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SPECIFICATIONS

Open width 7/8" to 6"

Gage Material .040 to .187"

Pin Diameter .093" to ½"

Lengths to 120".

SEMI-OFFSET

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is to prevent jamming or damage of the parts.

Blank workpieces are introduced at the top of a "waterfall" chute that leads to a barrel-shaped escapement mechanism which has four axial slots along its periphery. As the barrel indexes, one part enters the slot and is rotated upward 90° to the load position. The blank is picked up by live headstock and tailstock centers and inserted into the machine.

After the part has been processed, the centers return it to the same slot in the barrel. Following the next indexing, the finished part rolls out of the barrel and slides down to a belt conveyor. All loader and machine motions can be electrically interlocked through limit switches so the complete cycle is automatic.

Gear-O-Mation division, Michigan Tool Co., 7173 E. McNichols Road, Detroit 12, Mich.

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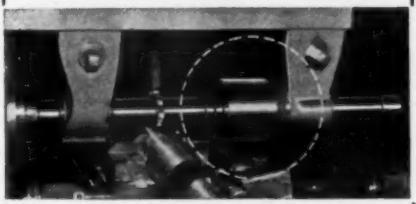
ELIMINATE MILLING MACHINE MAINTENANCE



UPS FEEDS AND SPEEDS 200%

See how General Electric, Jeffrey Mfg., hundreds of others absolutely end arbor bushing maintenance problems and decrease production costs on horizontal milling machines by replacing the bronze outer support bushing with a Jergens "Live" Sealed Roller Bearing Unit. Jergens Units with adjustable roller bearings hold precision—permit increases in milling speeds and feeds to take full advantage of carbide cutters. The rigidity of these units increases cutter life and eliminates chatter, frozen bushings, and twisted arbors. See how hundreds save thousands! Write for FREE case histories of actual company performance reports of jobs and dollars saved.

DONLEY PRODUCTS, INC.

Dept. MT-7, 11106 Avon Ave., Cleveland 5, Ohio

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CONCENTRIC LIVE CENTERS the original, patented spring loaded live centers

JAM PROOF

GREATER LOAD CAPACITY

LESS OVERHANG MEANS MORE RIGIDITY... MORE WORKING RANGE

AUTOMATIC THRUST ADJUSTMENT
Spring loaded spindle maintains constant tail stock thrust.

LONGER LIFE
Needle bearing distributes bearing stress over greater surface, thus holding close tolerances for much longer time.

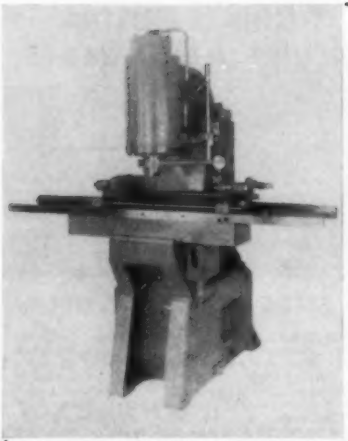
FASTER SPEEDS
Smaller turning radius gives much higher RPM rate than ordinary live centers.

Pat No. 2,520,473

Write Today for Complete Information

CONCENTRIC TOOL CORP., 2486 Huntington Dr., San Marino, Calif.

Use postpaid card. Circle No. 480



GREENERD

New 15 Ton Straightening Press Model No. S-15-D-E with spring centers. One handle to control ram and pressure exerted. Hydraulics and electrics are inter-connected.

See your Dealer or write for Catalog M-45.

Greenerd ARBOR PRESS CO
41 CROWN ST. NASHUA

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Two-Stage Hydraulic Pump

Two-stage hydraulic pump delivers from 600 cu. in./min. at 100 psi to 50 cu. in./min. at 10,000 psi, and weighs only 45 lbs. Its high speed at low pressure enables pistons to be adjusted to the work before high-pressure stage is needed.

Reservoir capacity is 2 gals. Common cover plate on which pump, motor, and valving are mounted allows use of different sizes of reservoirs. Standard universal motor is 1⅛-hp, 12,000 rpm, 60/50 cycle, AC/DC; not dual voltage.

Owatonna Tool Co., Cedar St., Owatonna, Minn.

Use postpaid card. Circle No. 157

High-Speed Countersink

Whitman & Barnes has announced the addition of a new style countersink that features a single flute construction. These high-speed countersinks are made for machine use and light portable work. According to the company,

for LOW COST GENERAL PURPOSE MARKING

"Flat dies mark rounds. Roll dies mark Flats"

Model No. 9

"Carried in Stock"

Write for No. 9 Marking Machine Cat. and prices.

ACROMARK Company
15 Morrell St.
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"THE ORIGINAL MARKING SPECIALISTS"

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PERMANENT BRAND NEW
MAGNETIC CHUCKS
AT SENSATIONAL PRICES

Eliminates clumsy fixtures and jigs • Retains holding power indefinitely • Non-Magnetic steel base gives greater stability • Insensible to shock and the effects of cooling fluids • No need of electricity so the danger of short circuits is eliminated.

- Precision made
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Size (inches)			Height (inches)	OUR PRICE	Dia. (inches)	OUR PRICE
4	x	6	2⅝	$ 66.00	4	$ 54.00
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6	x	10	2⅝	$ 88.00	8	$121.00
6	x	14	2⅝	$130.00		
6	x	18	2⅝	$205.00		
8	x	24	2⅝	$358.00		

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The Cutting Tool Discount House
151-A Grand St., New York 13 • CAnal 6-4992

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they provide easy feeding, smooth burr-free holes, and chatterless operation over a wide range of speeds and in a variety of materials.

They are available in ¼, ⅜, ½, and 1" sizes, which included point angles of 60, 82, and 90°.

Whitman & Barnes, 40600 Plymouth Road, Plymouth, Mich.

Use postpaid card. Circle No. 158

Portable Coating-Drying Unit

An automatic machine for applying and drying lubricating compounds on blanks prior to press shaping and drawing is now being produced by Murray-Way Corp. This machine cuts production costs by eliminating the manual operation of "swab-sticking" or spraying of lubricants. Mounted on a single portable frame with foot-operated stabilizers, it consists of three components: an automatic loader, a roller-coater,

TROUBLE
drilling stainless?
• Mistic Mist cooling
may solve your problems!
Cool the tool and not the chips! Use the most modern . . . efficient cooling method available — mist!
Mist cooling simplifies the most difficult machining and stamping jobs.
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One outlet or a complete central system. Multiple outlet units, and custom engineered centralized systems are available.
Learn how mist cooling can benefit you in time, labor and production costs. Write for informative literature.
Mistic Mist
AETNA MFG. CO.
181 So. York St.
Bensenville, Ill.

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and an infra-red continuous-type oven.

Blanks are manually stacked on the loading platform, where a vacuum cup picks up single blanks and deposits them on the roller-coater lead-in conveyor. An air jet removes any extra blanks which may have stuck to the one being lifted. As a final precaution, a special sensing unit rejects any blanks which the air jet has failed to separate.

The lead-in conveyor carries the row of single blanks through the roller-coater. The coated blanks are then passed through an oven equipped with infra-red lamps.

These machines are maneuverable from press to press or may be stationed at a central supply location.

Murray-Way Corp., P.O. Box 180, Birmingham, Mich.

Use postpaid card. Circle No. 159

DEBURRING

—and many other secondary finishing jobs on metal and plastic parts—is handled faster, cheaper and better with SCHAUER SPEED LATHES.

Write for Catalog 580.

Model shown equipped with collet. Also available with chuck.

SCHAUER MANUFACTURING CORP.

4502 ALPINE AVE.
CINCINNATI 42, O.

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Surface Grinder Attachment Permits Gaging Control

A new electronic gaging system developed by Electro-Autosizing Machine Corp. for grinder manufacturers allows the workpieces to transverse and rotate under the gaging anvil at high speed. It produces highly accurate machine control signals even though the pieces have holes or steps, or the anvil drops off the ends of the workpiece. Called a "discriminator" continuous gage amplifier, it selects the major dimension only. It has been used successfully on reciprocating and rotary surface grinders.

It can be quickly adapted to any existing surface grinder. Since the gage circuitry is tied into the existing grinder's hydraulic or electrical circuit, the necessity for the usual machine setup

Johnson on the job
At Pullman Standard Car Mfg. Co.
From an "at the plant" interview: "It is anticipated that production will be doubled on the Johnson, because it is a dual capacity press, allowing two men to work at the same time—one at the front, the other at the rear."
Solid proof of the satisfactory performance of the Johnson was demonstrated when a second order for the same type press was placed by the Pullman Standard firm.
50 Models of Johnson Presses
Inclinable, Straight Side, Gap, Horn
Special Presses Built To Order
Write for Catalog
JOHNSON MACHINE & PRESS CORP.
620 West Indiana Ave., Elkhart, Indiana

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is practically eliminated. The desired "dwell" and "final size" is simply dialed in on the calibrated control knobs on the console. Size consistency is maintained within .00050" regardless of wheel wear or dressing.

Electro-Autosizing Machine Corp., 7 William St., Closter, N.J.

Use postpaid card. Circle No. 160

Polyester Film Springs

Spring devices which are non-conductive and non-metallic, resistant to most corrosive conditions, extremely lightweight, and functional over a wide range of elongation have been introduced by Du Pont Film department technicians. The devices, made of "Mylar" polyester film, represent leaf, coil, and torsion types of springs, and demonstrate such properties as extendibility, retractability, and constant tension.

Du Pont technicians say that one of these devices might be used in safety equipment, toothed drive shafts, suspension packaging, shock-absorbing straps, and temperature-moisture sens-

AUTOMATIC INDEX TABLES

Continuous motion; skip indexing and uneven indexing available. Diameters from 16" to 80". Avey Division, Motch & Merryweather Cincinnati 1, Ohio

Avey

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DRILL and PILOT BUSHINGS

Frictionless —Rotary

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

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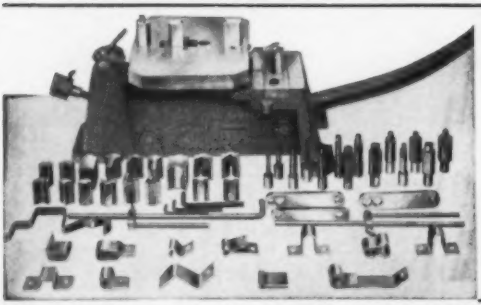


Multiform BENDER CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅛" x 1½" as illustrated, other models up to ½" x 8".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

Use postpaid card. Circle No. 340

ing devices. Other spring types, they said, could provide extendable "snap" antennas, compressible weather stripping, and retractable wiring and circuitry.

Spring may be stretched up to 3% elongation and still recover original shape, while those of copper, steel and other metals will be permanently deformed after about .5% elongation.

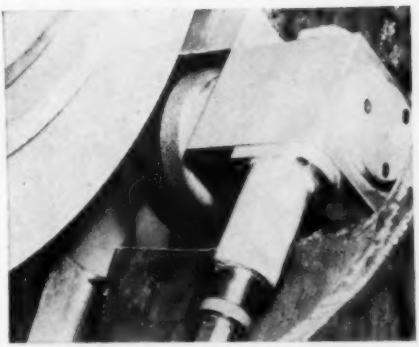
E. I. Du Pont de Nemours & Co., Wilmington, Del.

Use postpaid card. Circle No. 161

Dressing Tool Combines Traverse, Rotary Advantages

A diamond-set rotary tool that incorporates the advantages of rotary motion with traverse dressing of grinding wheels has been introduced by Wheel Trueing Tool Co., Detroit.

Called a Tru-Grit rotary diamond-set traverse dressing wheel, it is designed to finish a workpiece that must



be consistently held within a microfinish range for specific purposes without sacrificing other tolerance limitations.

It is independently powered and can maintain a specific finish on work within a range of 30 to 55 rms.

Wheel Trueing Tool Co., 3200 W. Davidson Ave., Detroit 38, Mich.

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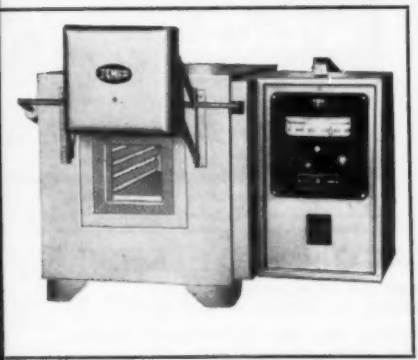
FOR L-O-N-G WORK



Why buy a bigger furnace than you really need? TEMCO Type 1900 is ideal for long work loads . . . no "waste" space to be heated. Chamber is 13-1/4" D x 4-3/16" H x 4-7/16 W". Continuous operation to 2300°F. Big power reserve for heavy loads, fast heating, quick recovery. Cased in husky steel shell . . . scientifically insulated. Available with or without controls. Priced from $215.

TEMCO®

Write for free literature and name of nearest dealer.

ELECTRIC FURNACES

THERMOLYNE CORPORATION, 488 Huff St., Dubuque, Iowa

(Formerly Thermo Electric Mfg. Co.)

Use postpaid card. Circle No. 341

Machine-Mounted Collet Holder

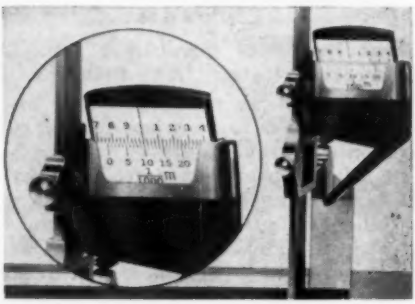
A collet holder for use on vertical milling machines using the R-8 collet has been introduced by Park Tool Die Co., Inc. This holder is made from No. 16 heavy-gage steel. Mounted right on the machine, it is available in either a gray or green finish.

Park Tool & Die Co., Inc., 20 Somerton St., Rochester 7, N.Y.

Use postpaid card. Circle No. 164

Magnifier Cuts Height Gage Reading Time By 60 Percent

A Mark V magnifying instrument which features direct reading from the lens is being introduced for use on all precision machine tools equipped with a height gage. Readings can be made from the lens without removing the



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"O" RING - SNAP RING GROOVES

1/4" to 6" diameter

QUICKLY - ACCURATELY

2 and 3 points check

INTERAPID MODEL IRA-2

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SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish

Set No. 3-17, 28 punches with indexed stand—size 5/32" to 1/2", by 1/64"—plus handy 17/32" size. Length 4-7/8" ONLY $19.40

Single sizes available

R. L. SPELLMAN CO. - URBANA, OHIO

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gage or turning it horizontally. Adjustments can be made in working position.

On milling machines, jig borers, radial drills, and other equipment where it has been used, gaging time has been reduced up to 60%. The device incorporates a precision ground optical lens and mirrors and magnifies scale numbers 2.5 times.

Pan Technics, Inc., 1230 Pan Technics Bldg., Encinitas, Calif.

Use postpaid card. Circle No. 165

"C" Clamp With Locking Feature

A toggle action "C" clamp embodying a locking feature to grip work has been developed by Fast Grip Mfg. Co. It is easily applied to the work and can be released instantly. An adjustable spindle adapts the clamp to a wide range of sizes.

Features include an electro-plated spindle equipped with a lock-nut, 2400

psi holding force, and aluminum-alloy inserts between the handles.

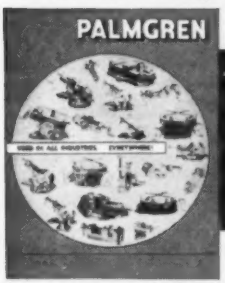
This tool can be used as a hand vise for sheet-metal work; steel-plate fabrication; and welding, milling, drilling, and grinding.

It has a 2" x 1½" throat and a 7/16" spindle diameters.

Fast Grip Mfg. Co., P.O. Box 4915, Detroit 19, Mich.

Use postpaid card. Circle No. 166

Get this Completely Illustrated



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on Vises and Rotary Tables for Production, Tooling and Maintenance now. 70 different models and types—vise jaws from 1½" to 8".

PALMGREN PRODUCTS

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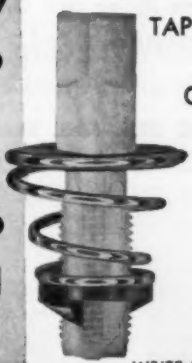
TWO for ONE

Announcing BURR-BIT FOR PIPE TAPS!

TAP & DEBURR IN ONE OPERATION



Fits All Make Taps

Leaves Smooth Clean Chamfer

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VERNON DEVICES INC.

481 East 3rd Street, Mt. Vernon, N. Y.

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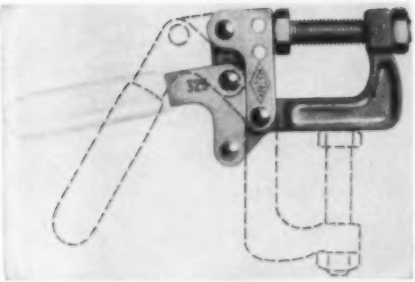

Holddown Toggle Clamp

A holddown, medium-duty toggle clamp is designed for welding to another member. The front or top of the clamp's base can be welded to the sides of conveyors or containers or the edges of lids or covers.

This clamp, which weighs 15 oz., has a holding pressure rated at 800 lbs. Its jaw, or holddown bar, is made of forged alloy steel and moves 90° to clear the working area.

Detroit Stamping Co., 330 Midland Ave., Detroit 3, Mich.

Use postpaid card. Circle No. 167

Dip Tanks for Plastic Coating

Fidelity Chemical Products Corp. has introduced its line of circular and rectangular dip tanks. These units have been designed to be used specifically with Fidelity's hot-melt-plastic coating and similar materials.

The circular tank shown is available in capacities from 1 pint to 5 gal. Capacities of the illustrated rectangular tank range from .1 gal. to 3 gal. All

CAMS

Complete Facilities For
CAM MILLING and
CAM GRINDING

To Your Specifications

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DIVISION OF
HIMOFF MACHINE CO.
23-22 44th ROAD LONG ISLAND CITY, N.Y.

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FLUTED TOOLS
Cutters • Millers • Taps • Reamers
MADE AUTOMATICALLY
Economically from Solids
Get details on Miller and Grinder
WARDWELL Mfg. Co.
3807 Ridge Rd., Cleveland 9, O.

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DYKEM STEEL BLUE
Stops Losses
making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301G North 11th St. • St. Louis 6, Mo.

Use postpaid card. Circle No. 349

units are air insulated and are finished in black wrinkle enamel.

They are equipped with adjustable thermostatic controls which allow for automatically controlled working temperatures throughout all parts of the tanks. Cast aluminum construction, combined with uniform heat distribution, prevents burning.

Fidelity Chemical Products Corp., 470-474 Frelinghuysen Ave., Newark 12, New Jersey.

Use postpaid card. Circle No. 168

"Powerall" Coil Cradle

A "Powerall" coil cradle modified to handle material up to 30" wide at extremely slow speeds had been introduced by The Medelton Co., Inc.

The drive is through a wormgear-type of speed reducer resulting in a maximum speed of 10' per minute. This unit is demand controlled by a combination actuator switch and loop control which operates on 90% captive air. An electrical control box on the rear of the unit provides forward or reverse operation, and has an off position for safety while loading.

The Medelton Co., Inc., 262 E. 3rd St., Mount Vernon, N.Y.

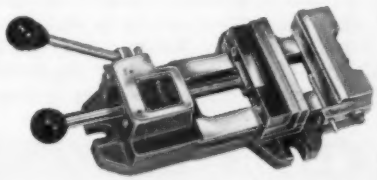
Use postpaid card. Circle No. 169

NEW

LASSY Rapid LOX

INSTANT ACTION—"THRED LOCKED" VISE

Assures Powerful Dependable Clamping With Instant Jaw Positioning.



Patented

- Jaw Pressure Is Selective and Repetitive.
- Ideal for Milling, Drilling, Grinding and Jig Boring—of One Piece or Thousands.

Order from Your Industrial Supplier

Mfg: Lassy Tool Co., Plainville, Conn.

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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

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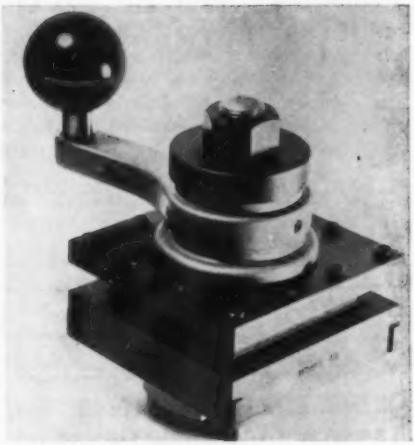


Four-Position Lathe Turret

A four-position automatic indexing turret for engine lathes is now being manufactured by Westwood Engr. Co. Handle-operated indexing mechanism of the turret offers repeating accuracy and fast operation. One movement of the lever forward and back unlocks the turret, indexes to the next tool position and relocks for the cut. No pin plungers are used. Indexing is done with a rectangular hardened and ground tool-steel bolt.

The turret is furnished ready for mounting on the compound slide. It is available for 12" through 16" machines.

Westwood Engr. Co., 2234 Purdue Ave., Los Angeles 64, Calif.

Use postpaid card. Circle No. 170

Magnetic Pickup Assortment

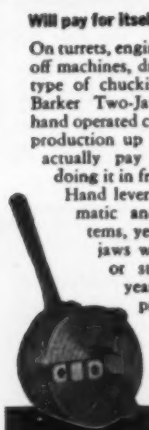
Electro Products Laboratories have announced a magnetic pickup experimental assortment. It is complete with sub-miniature, miniature, standard output, and high output pickup, AN connector, plastic box, and detailed operating and application data.

Electro magnetic pickups are self-generating input transducers providing

LABOR SAVING
Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



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CHUCK DIVISION
THOMAS HOIST CO.
245. HOYNE • CHICAGO 12, ILL.

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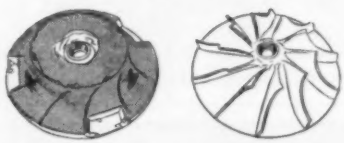
CERROTECHNICS
saves TIME • LABOR • MONEY
in machining turbine rotors



CERROTECHNICS is the practice of using low-temperature-melting CERRO* ALLOYS to expedite many industrial operations.

For instance: on aircraft manufacturer supports the thin blades of turbine rotors in CERROBEND® to prevent distortion in machining. Then the alloy is melted away at 158°F. **Write for further information.**

*T. M. Cerro Corp.

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SUBSIDIARY OF CERRO CORPORATION
Room 1505, 300 Park Ave., New York 22, N.Y.

Use postpaid card. Circle No. 353

the connecting link between mechanical motion and instrumentation. They generate voltage and power without the aid of power supplies and seldom need additional amplification to actuate electrical or electronic circuitry.

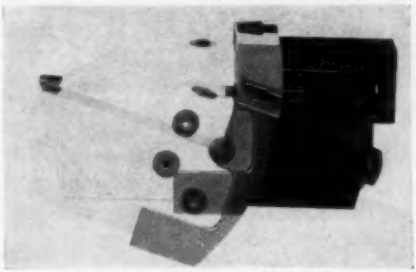
They generate voltage/frequency from mechanical motion (without contact) in proportion to the speed of metal objects interrupting their magnetic fields. The external magnetic field that they create, when interrupted by a gear tooth, blade, pin, or metal projection, generates AC voltage to help solve speed measurement and control problems.

Electro Products Laboratories, Inc., 4500 N. Ravenswood Ave., Chicago 40, Illinois.

Use postpaid card. Circle No. 171

Cut-Off Tool Has Adjustable Rake Angle

A Manchester adjustable-rake angle cut-off tool, has been engineered by Portage Double Quick, Inc. This tool



can be set on zero rake or any positive rake angle up to 16°. The rake angle is held rigid by two locking screws and a beveled circular tee slot.

New rake angles can be set without removing the tool from the machine or losing center location. Since rake angles vary depending on the type of metal to be cut off and other operating conditions, this one tool can replace several fixed tools.

Portage Double Quick, Inc., 1037 Zweitzer Ave., Akron 11, Ohio.

Use postpaid card. Circle No. 172

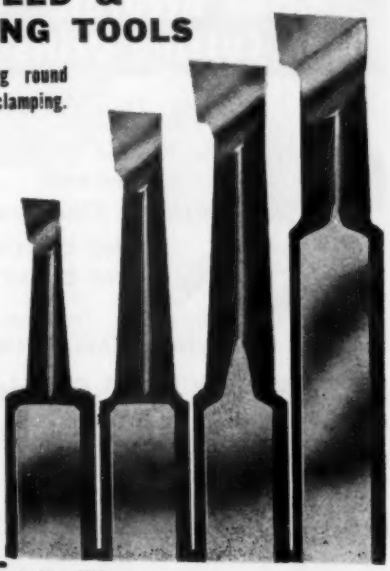
SOLID HEAD, HIGH SPEED & CARBIDE TIPPED BORING TOOLS

Available in standard and stubby models featuring round shanks with parallel flats for solid, three-point clamping.

- Simply and solidly clamped in KDK or KIRKLEE tool holders
- Parallel flats on round shank provides new rigidity and ease of set-up.
- Ideal for all offset boring heads
- Four parallel flats simplifies resharpening

Versatile LIDO Boring Tools are designed to be used in engine and turret lathes, jig borers, automatics, boring heads and boring machines. Available in tool room sets—carbide or hss—in bore sizes ranging from ⅛" to 1¼" in five shank sizes.

Patent applied for



LIDO TOOLS

P.O. Box 403

Costa Mesa, California

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PYRO SURFACE PYROMETER

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PYROMETER INSTRUMENT CO., INC.

Bergenfield 3, New Jersey

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Lima, Ohio

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1/8" to 2½" dia.

90° to 140° included angle with Variable Clearance

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NO COLLETS

True Conical Relief for FAST CUTTING

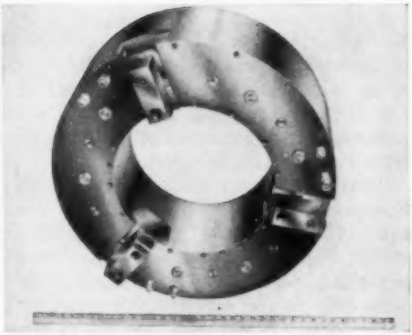
STERLING "DV" Drill Grinder

Positive setting for included angle and clearance angle plus accurate centering produce the right point for every material. For details and prices write for Bulletin "DV" TODAY.

McDONOUGH MFG. CO.

1520 Galloway, Eau Claire, Wisconsin

Use postpaid card. Circle No. 357



Centerless Air Chuck

A self-contained air chuck which allows work to be passed through the center of the chuck body is available from Mollenberg-Betz Machine Co. There are no external air cylinders, draw rods, or permanently attached air supply lines to operate the jaws.

Once the air supply is applied to the inlet valve located on the chuck body, the chuck jaws are activated. The air supply can then be removed and the pressure inside the chuck housing is retained. Because of this self-contained design, and with no permanent air supply connections, the chuck is allowed to rotate, move axially, or travel in any manner with the machine on which it is mounted.

Standard models are provided with a ⅞" movement per jaw, allowing 1¾" diametrical movement. Chucks are available from 12 to 48" I.D. and can be used as a rotating or stationary chucking device, either horizontally or vertically mounted.

Mollenberg-Betz Machine Co., 20-26 Henry St., Buffalo 2, N.Y.

Use postpaid card. Circle No. 173

Snap-Action Foot Switcher

G. E. has added two cast iron snap-action foot switches. The CR150 ratchet type is designed for maintained control. The contact mechanism consists of a precision snap-action switch

with one normally open and one closed contact. As the pedal is depressed the contacts are actuated (the open contact closes and the closed contact opens) and remain in this position until the pedal is depressed again.

The CR150 A7 type is a reverse-sequence mechanism which has two sets of snap-action switches. One contact is normally opened and the other closed. When the pedal is depressed, the contacts of one switch operate before those of the second. Upon release of the pedal, the contacts in the switch that operated first will again operate first.

General Electric Co., Schenectady 5, New York.

Use postpaid card. Circle No. 174

Wheel Eliminates Excessive Heat

U. S. Diamond Wheel Co.'s D11V9 Turbogrind diamond wheel eliminates excessive heat, both in the work piece and the bond, by the use of integrated vanes vortext laminar air into an effective coolant flow.

The redesigned thinner core, strengthened by the vanes, cools faster and is self-dressing. Customer usage shows wheel life has been increased as much as 15%. Turbogrind diamond wheels can be used with equal success in wet, mist, or dry grinding.

U. S. Diamond Wheel Co., 835 Illinois Ave., Aurora, Ill.

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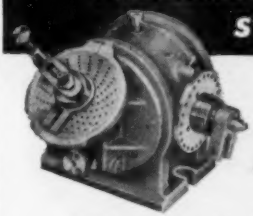
TOOLROOM ACCURACY
PRODUCTION LINE
STAMINA

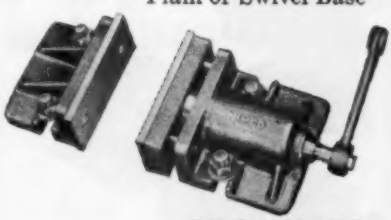


DIVIDING HEADS

Plain or Double Swivel with tailstock. 6½", 8" or 10" Swing. (8" and 10" sizes have exclusive floating index plate).

5" MACHINE VISE

Plain or Swivel Base



QUICK-CLAMP MIL-VISE

Jaw Width — 6" or 8"
Jaw Opening — Unlimited

Write for detailed literature.

Nichols Morris Corp.
76-G Mamaroneck Ave.
White Plains, N. Y.

NIMCO • TOOLS

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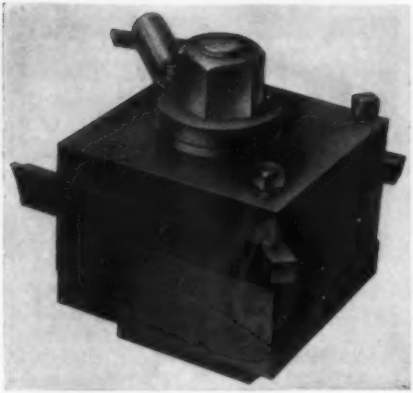


Holder Works on All Lathes

A tool holder that is claimed to do the work of five conventional holders in lathe operations is announced by Koning Machine & Tool Co. This holder is machined to fit all lathes. It permits deeper cuts and reduces tool wear. The rocker base allows accurate positioning of the tool in relation to the centerline of the work, eliminating the trouble of trial-and-error shimming of tools.

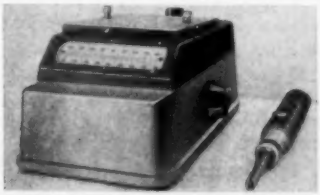
Koning Machine & Tool Co., Holland, Michigan.

Use postpaid card. Circle No. 176

Probe Detects Metal Differences

A thermoelectric probe which detects differences between metals, their alloys, and electro-deposited metallic coatings has been developed by Electro Impulse Laboratory, Inc.

Metal bars or sheets which look exactly alike can be separated accord-



with
DIRECT INDEXING

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" 12" spiral drive.

Write for Catalog

CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave. ▪ Cincinnati 9, Ohio

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Scientifically designed to diminish vibration in boring, the MODERN boring bar has various size holes drilled from each end to minimize harmonic vibration. Hole diameters were determined by using a VIBRATION METER and probing bar every ¼". The cavity is filled with shock absorbing material under vacuum, thus obtaining a dead bar of superior strength.

MODERN
MANUFACTURING CO., Inc.
680 Davisville Road, Willow Grove, Pa.

Use postpaid card. Circle No. 360

ing to their thermoelectric power by simply contacting two points of the metal and noting the thermoelectric power. This instrument is useful in incoming inspection, metal storerooms, and machine shops.

Electro Impulse Laboratory, Inc., 208 River St., Red Bank, N.J.

Use postpaid card. Circle No. 177

"Stack-n-Nest" Tote Pan

The G. B. Lewis Co. announced a new "Stack-n-Nest" tote pan to its line of materials handling containers. This pan measures 22" x 14" x 5" and is designed to work in conjunction with the 22" x 14" x 8" model. The two sizes will interstack (shown). The same matching dolly and pan cover fits both sizes.

These tote pans are a one-piece fiberglas reinforced polyester molding. They are impervious to oil, water, and most chemicals.

G. G. Lewis Co., Watertown, Wis.

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surface harden TOOLS & PARTS without special equipment

KĀSENIT COMPOUNDS

For use in tool rooms and machine shops, Kasenit is deep-penetrating, eliminates soft spots and warping. Absolutely safe, easy to use. Booklet B tells how these compounds can help you. Write now!

Available direct or from leading industrial distributors.

KĀSENIT CO. 12 KING ST., MAHWAH, N. J.

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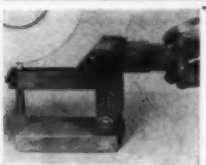

New 1961 Model "SS"
RADIUS DRESSER

Newly engineered and redesigned after 19 years of field testing. Convex, concave, or complex combination shapes are dressed quickly and easily by even inexperienced operators. Accurate to .0002". Dresses all wheels up to 12" diameter. Write today for free illustrated folder.

Low Price—$149.50
Includes Diamond

SOMERSET TOOL CO. 244 Virginia St. Hillside, N.J.

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Fortune
TUMBLING MEDIA
for **Deburring and Finishing**

Preforms in over 300 shapes, sizes and bonds for all barrel and vibratory operations.

- Finest bonding materials
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Free lab service reports proper media for your parts.

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Fortune Industries, Inc.
11770 DEXTER RD. CHELSEA, MICH.
Phone GR. 9-3621

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All-Purpose Machine Base

An all-purpose heavy-duty machine base designed to meet many requirements and a variety of industrial needs has been introduced by Marvco Tool & Mfg. Co. The standard base is made up of four steel panels combined with four aluminum extruded legs of the stress-lock design.

A separate top plate of aluminum or steel, ground or unground, and in thickness or size required completes the unit.

All models are constructed to withstand 20,000 lbs. static load.

Marvco Tool & Mfg. Co., 3831 Podlin Drive, Franklin Park 6, Ill.

Use postpaid card. Circle No. 179

25-Ton Punch Press

The Allen Model BT-25 has a die space of 7⅜" shut height, and 8" throat height. Adjustable V-type ram gibs are 14" long; die bed is 12" by 21", with 5" by 8" opening; and press can be inclined 30 degrees. Standard stroke is 2½".

Alva Allen Industries, 1001-15 N. Third St., Clinton, Mo.

Use postpaid card. Circle No. 163

Holders for Throwaway Inserts

Standardized Kendex units that provide a "building-block" approach in tailoring special tools for boring, chamfering, and facing operations are now offered by Kennametal Inc. These adjustable units utilize standard Kendex throwaway inserts.

Two-way adjustments of bore diameter and shoulder lengths provide tolerances which can be maintained on

FASTER READING **DIAL CALIPER**

• Designed for fast precision • Engraved graduations simplify reading—Knife jaws for inside measurement, outside and depth measurements—can be locked in position—All operating components are completely enclosed • Precision built from stainless steel and brass • 4 Models: 6"—$39.00, 8"—$42.00, 12"—$59.80, 24"—$166.30.

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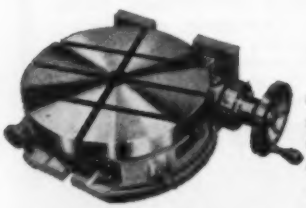
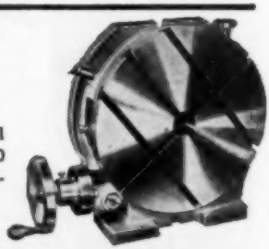
Horizontal & Vertical
Sizes 9" — 25"



Guaranteed 60 seconds or less total accumulative angular error. (60 seconds equals .0087" at 6" diameter.)

Write for Catalog 23A



TROYKE MFG. CO. 11296 Orchard Street, Cincinnati 41, Ohio

Use postpaid card. Circle No. 366

critical dimension work by micro-adjustment of a readily accessible screw when compensation for insert wear is required. The adjustability of these units also permits dimensional changes without requiring a new tool. Kendex units are available with rake and lead angles.

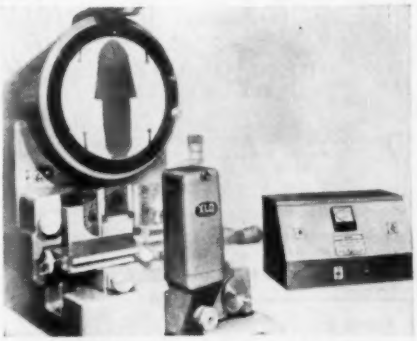
Kennametal Inc., Latrobe, Pa.

Use postpaid card. Circle No. 180

Light Aids Optical Inspection

Since screen illumination in optical projectors diminishes as the magnification increases, an intensified light source is desired when higher magnifications are used. Mercury arc light equipment is now available to give clarity and sharpness of the image, according to Ex-Cell-O Corp.

Contour projectors now can be purchased with mercury arc light equipment, and existing projectors can be easily converted. The mercury arc light, having an intrinsic brightness 45 times



that of a standard tungsten filament, is recommended for use at magnification of 20X and over on 14" projectors and 50X and over on 30" projectors. The arc light can also be used at lower magnifications by setting a switch on the power supply unit to "low intensity."

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

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MARTIN "Gem" AIR VISES

8 convenient sizes from 5" to 12" capacity

FAST, POWERFUL, PROVEN, PRECISION EQUIPMENT, for LONG LIFE and LOW COST.

Also screw operated vises.

J. E. Martin Machine Co.

Springfield, Ohio FAirfax 2-3121

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Cadmium plated, large selection of styles and sizes. Specials on request. Send for FREE catalog.

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At Last! **ELECTRIC FURNACES**

- **WITH INPUT POWER CONTROL**
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MACHINE AND TOOL ACCESSORIES COMPANY
7413 Lanier Drive Cleveland 30, Ohio

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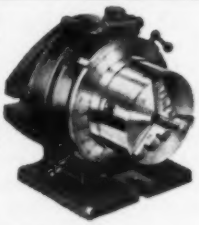

ELISHA PENNIMAN
460 S. Main St. • West Hartford, Conn.

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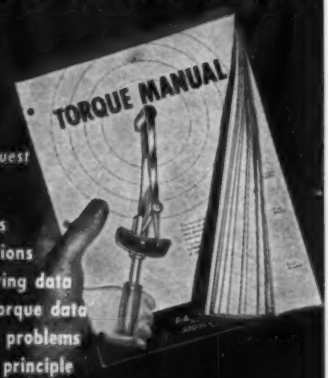
"TORQUE WRENCH" MANUAL



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Screw torque data
Adapter problems
General principle

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ADDISON QUALITY ILLINOIS

Manufacturers of over 85% of the torque wrenches used in industry

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Solid Chrome Gage Blocks

The Webber Gage Co. has announced the development of two new series of solid chrome carbide gage blocks.

The series 28 "Thin" set (illustrated) includes blocks ranging from .010" to .090" in A plus, AA, and Laboratory Master accuracies. They have been planned to meet the specific needs of manufacturers who produce miniature precision parts.

The second series includes two sets, one of 11 and another of 21, which are available in .000005" and .000010" steps in the Laboratory Master grade.

Webber Gage Co., 12900 Triskett Road, Cleveland 11, Ohio.

Use postpaid card. Circle No. 189

Tool Bits For Tough Applications

A new series of tool bits, designed for exceptional wear resistance and long life, has been introduced by Morse Twist Drill.

Known as the "Or-Bit" series, the line is available in either M4 high-speed steel or cobalt steel.

The IV series of M4 high-speed steel combines abrasion and resistance with high edge strength to withstand the shock of intermittent cuts. It is available in regular flat and square sizes, and ground or form finished.

Series XV is made of cobalt steel and is especially suited for machining high-tensile-strength materials, such as

heat-treated steels, and for resisting the abrasion encountered in cutting hard cast iron, cast steel, aluminum, brass, and plastics.

Morse Twist Drill and Machine Co., a Division of Van Norman Industries, Inc., New Bedford, Mass.

Use postpaid card. Circle No. 193

Surface Measuring Instrument Gives Readings in Microinches

A portable, transistorized, battery-powered instrument for measuring surface finishes on metals, plastics, ceramics, and organic materials has been added to the line of Brush products. Designated Model MS 1000 Surfindicator, this unit gives measurements from 1 to 1000 microinches and can be used at any point in a production line or inspection area. Pickup stylus, capable of detecting variations

of ½ microinch, contains a transducer element which generates a current proportional to surface variations.

Possible errors which might result from surface waviness as distinguished from roughness are eliminated by wave-length "cut-offs" which are adjustable for the particular surface under test.

Over-all size of the unit is 6¾" x 7½" x 5", and it weighs 5½ lbs.

Brush Instruments Division, Clevite Corp., 37th and Perkins, Cleveland 14.

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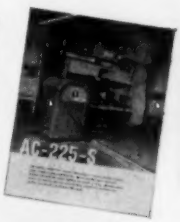
NEW LINCOLN 225-AMP WELDER PERFECT FOR SMALL SHOP!

Here's a welder that can save time and earn dollars for you. With it you can do just about everything—weld mild and stainless steels, cast iron; braze; solder; thaw frozen pipes; hardsurface. Full 225-amp output lets you handle large ⅛" electrodes, big jobs, fast. It helps you hustle work through your shop quickly and efficiently.

Only Lincoln makes this welder which sells for less than $200 and which will burn ⅛" electrodes. Costs less than many 180-amp welders.

WANT DETAILS?

Send for new bulletin No. 4610.1. Describes machine and accessories, production and repair uses. Write today. The Lincoln Electric Company, Dept. F-2141, Cleveland 17, Ohio.



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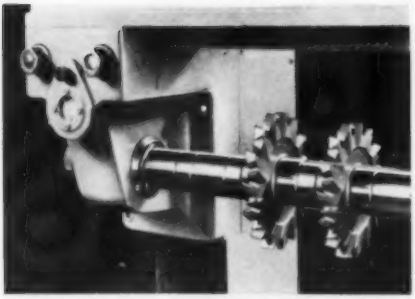

Anti-Friction Support Bearing Fits Housing Without Reboring

An anti-friction arbor support bearing, that is available in standard sizes to fit machine's support housing without reboring has been introduced by Briney Mfg. Co. This bearing has a large number of balls that are distributed evenly over the bearing race. This provides full length support, as well as minimizes friction and increases arbor rigidity.

Since the bearing seats within the support housing there is no work and fixture interference.

Briney Mfg. Co., P.O. Box 208, Pontiac, Michigan.

Use postpaid card. Circle No. 185

Port Contour Cutters

Metcut of Rockford, Ill., has announced the availability of revised standard port contour cutters. These cutters are for either SAE or AND port openings and incorporate a tang drive. They are easily adapted directly to the machine spindle by utilizing standard drill drivers.

This method of driving reduces the possibility of runout due to inaccurate alignment, and provides an economical way of adapting the precision cutter to most standard machine spindles without intermediate assemblies.

All sizes of these contour cutters are available from stock. Features include

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DEXCO CORPORATION

15778 Telegraph Road

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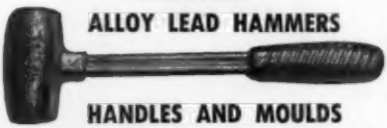

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Manufacturers Of Lead Hammer Products

15961 Hartwell Ave. Detroit 27, Mich.

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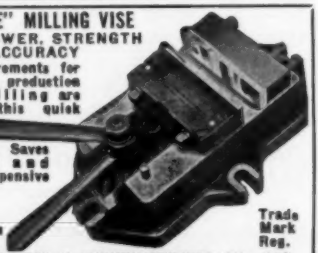

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for manufacturing management

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This complete guide is packed with dollar-saving ideas and programs for manufacturers. The authors have spent nearly seven years in compiling data in the field of cost reduction and administration. Much of the material is based on successful cost reduction efforts of more than forty companies. This book provides management with complete programs including sample directives, assignments, forms and progress reports. Written in non-technical language, it offers step-by-step instructions for instituting and carrying out complete programs for cutting costs.

More than 1200 self-appraisal questions are included embracing administration, financial control, industrial engineering, industrial relations, manufacturing operations, production control, purchasing, marketing and quality control. These probing, cost-related questions provide an opportunity to audit a company's entire operation.

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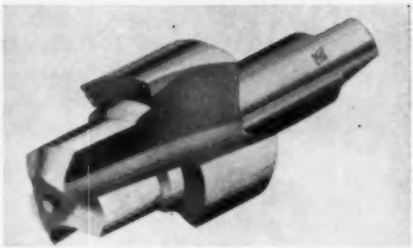

ground form relieved flutes, integral pilot or reamer, proper shear angles, and premium high-speed steel.

Metal Cutting Tools, 301 S. Water St., Rockford, Ill.

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Driving Centers for Tubular Work

A line of special driving centers has been brought out by PowerGrip, Inc., to hold tubular workpieces for O.D. turning, grinding, or spline cutting. The workpiece is firmly held and can be machined from end to end in one chucking. This saves time and produces a higher degree of concentricity.

The center has a bull nose and is spring-loaded. When pressure is applied to the tail stock, the center retracts, causing the end face of the work to engage drive pins.

Work up to 8" I.D. can be accommodated. Adapters can be furnished to mount on any standard spindle.

PowerGrip, Inc., Rockfall, Conn.

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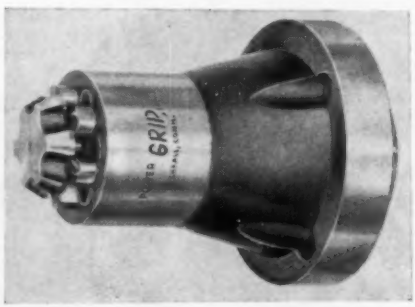
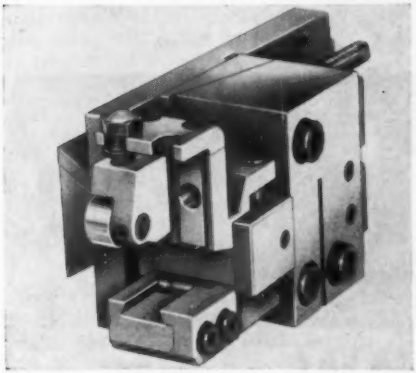


Universal Slide For Davenports

A "D" position universal type slide for Model B Davenport screw machines, developed by Screw Machine Tool Co., now will mount separate tool holders or holding blocks on which lateral adjustments can be made. While the slide remains on the machine, tool holders are easily installed and removed as job setup changes require. The slide



will hold a shave tool holder and block (shown), a knurl tool holder and block, or a flat, circular, or dovetail type form tool holder.

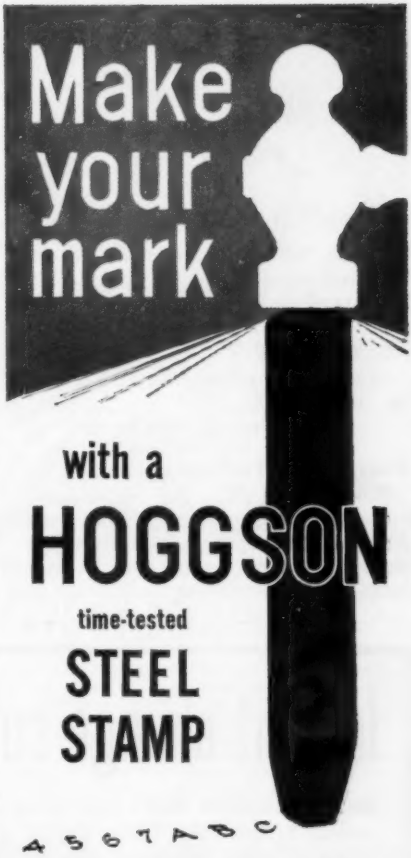
Designed primarily to accommodate standard tooling, the universal slide offers many possibilities in modifying and adapting special tooling for lateral adjustments.

Screw Machine Tool Co., 17565 Swift Ave., Detroit 3, Mich.

Use postpaid card. Circle No. 190

Drill Holder Bushings

A new line of split-type bushings to fit all screw machine drill holders and floating holders has been announced by Mueller Industries. The new design permits bushing to grip tool around ¾ of its circumference for accurate fitting and line-up. Tool slippage or distortion of floating holder is eliminated because the bushing holds the tool tightly with less clamping pressure.



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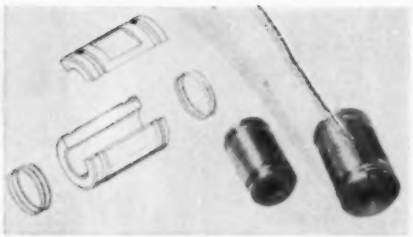


These bushings are made of carburizing steel which is ground after heat treating. Sizes include all letter, number, and fractional drill sizes from No. 80 to 63/64".

Mueller Industries, 510 E. Rand Rd., Mt. Prospect, Ill.

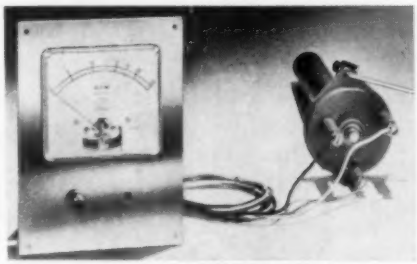
Use postpaid card. Circle No. 191

Electronic Tachometer

Rampe Mfg. Co. has developed a tachometer for measuring shaft speeds from 0 to 2500 rpm. It features an electronic metering panel and a remote pickup head, requiring no current flow when in actual operation. The circuit is actuated by a front panel switch. The pickup head can be attached to any shaft end by a single stud bolt.

Applications include rpm measurements of barrel speed on tumbling machines and mixers, operating speed of machine tools and special assembly devices, as well as most applications requiring accurate reading of motor speeds.

Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio.



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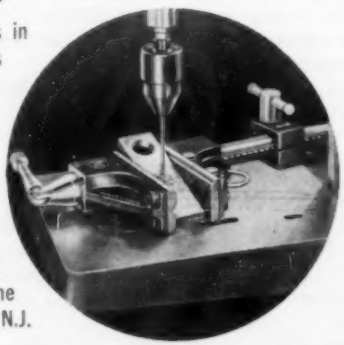
Instant change cuts production costs

AUTOMATIC KEYLESS CHUCK permits tool changes in seconds without stopping the spindle; prevents chewed-up shanks. One spindle does the work of many. The greater the torque, the tighter the grip.

DRILL PRESS VISE floats, and locks **instantly,** positively, in any position on the table. Holds work safely for accurate drilling and tapping. Three models: 8", 9" and 12" capacities.

Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N.J.



WAHLSTROM® AUTOMATIC CHUCKS

AMF

FLOAT-LOCK® SAFETY VISES

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"Vantrol 700"

A new formula, called "Vantrol 700" water-soluble compound, has been developed by Van Straaten Chemical Co. to replace straight oils in metal cutting operations.

The company claims that costs in cutting and grinding operations have been greatly reduced, and that the compound can replace straight oils in about 95% of all operations. It has an affinity for metal and is selectively absorbent on metal surfaces.

This compound mixes readily in either soft or hard water, and is rancid resistant.

"No health or fire hazards exist in the handling or storage of Vantrol 700," said Van Straaten. It has an extremely high viscosity at room temperature, caused by its colloidal nature. Its ease of emulsification makes any residue readily removable from machines, tools, parts, and operators.

It eliminates smoke and oil vapors, and is ideal in the automotive industry, jet parts manufacturing, and farm equipment industry.

Van Straaten Chemical Co., 630 W. Washington St., Chicago 6, Ill.

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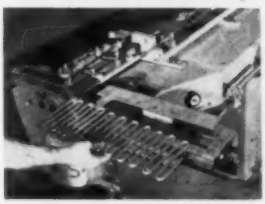
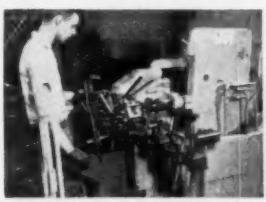
IF YOU MAKE PARTS LIKE THESE...

YOU CAN SAVE BY BENDING!

By production bending the "Pines-way," hundreds of metalworking plants are now benefiting from the cost-cutting advantages of cold-bending tubing, pipe, extruded or rolled shapes into parts similar to those above. Parts are produced faster, with smooth, strong bends. This means improved product quality at reduced costs.
A wide range of bending on large or small work, long- or short-run jobs, is easily accomplished by a complete line of standard Pines Bending Machines. Hydraulic power and automatic operation provide maximum accuracy, efficiency, and economy. Find out today, without obligation, how these machines can produce your parts at less cost.



Serpentine coil formed on Pines Rotary Machine at 900 bends an hour with 8% material savings, reduced assembly costs.



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All-Purpose Cutting Lubricant

Cuttap, an all-purpose cutting lubricant, has been especially compounded for use with stainless steel and other hard metals. By utilizing a chemical film between the face of the tool and the surface of the work, surface tension and adhesion are reduced. It does not stain aluminum.

Cuttap, according to the company's spokesman, prevents tap breakage, releases stuck taps, improves surface finish, and increases thread accuracy.

Canton Chemical Corp., Wilmington 99, Delaware.

Use postpaid card. Circle No. 192

Control For Flexopresses

Precision Welder and Flexopress Co. has developed Flexotron, a precise control for the company's Flexopresses.

The control combines a fused disconnect, main drive reversing motor starter, control transformer, lubrication pump fuses, control fuse, remote speed control switch, and "brain" panel in a console. Among its unique features are timed inching and top-stop adjustments that permit any increment or height from full-shut to full-open.

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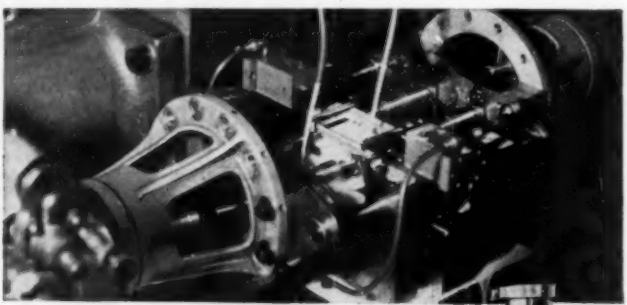

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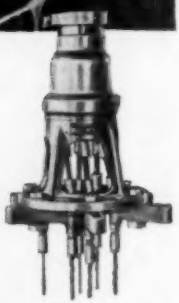

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An emergency stop button glows red whenever power is on, and the top-stop button glows green when lubrication pressure is safe. The control panel includes a total strokes counter and a spm dial.

Precision Welder & Flexopress Co., 3520 Ibsen Ave., Cincinnati, Ohio.

Use postpaid card. Circle No. 195

Clutch Controlled Handle Speeds Thread Gaging

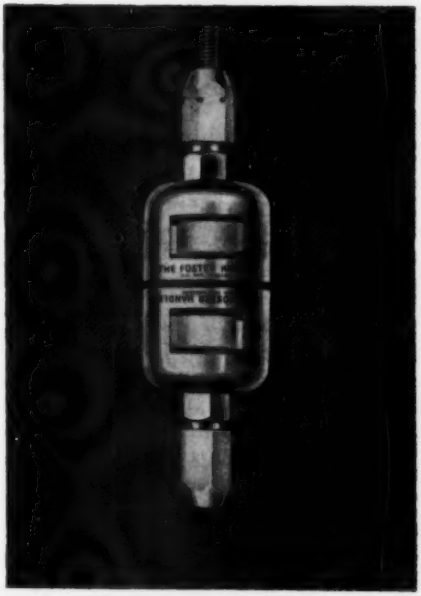
A redesigned gage handle, designated the model HD61, has been announced by C. E. Foster Gage Corp.

This device is claimed to make possible accurate inspection at speeds up to 10 times that of conventional methods.

Features include a fingertip control action, a thread cleaning brush, AGD standard taperlock and reversible adapters, and easy-to-change tapes.

C. E. Foster Gage Corp., 5341 English Ave., Indianapolis 19, Ind.

Use postpaid card. Circle No. 196



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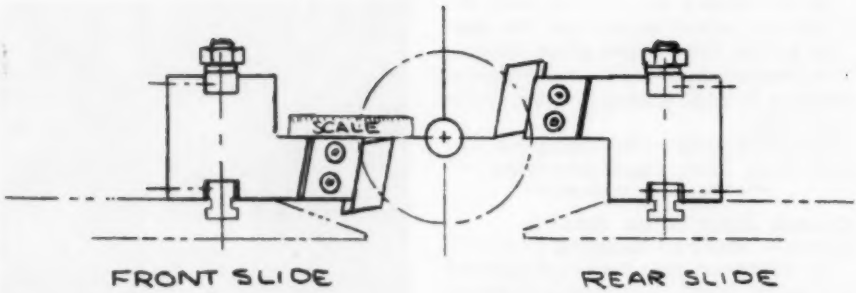

Dovetail Form Tool Holder

A 5/8" dovetail form tool holder with a 10° front rake (fits front and rear slide) for single-spindle automatic screw machines is announced by Royal Machine & Tool Corp. Known as Grip-Lock, it is claimed to effect savings of 40%.

When resetting a tool after sharpening, a scale can be used to align the cutting edge with the centerline of the production part. Little or no adjustment is normally required, and downtime is kept to a minimum.

Royal Machine & Tool Corp., 31 Deming Road, Berlin, Conn.

Use postpaid card. Circle No. 197

Threadless Clamp

United Associates has developed a finger-tip control threadless clamp made of high-tensile aluminum alloy. The clamp has a threadless spindle which eliminates the frame from twisting after tightening. The anvil and spindle do not turn while pressure is being applied. It can be furnished with anvil or V-spindles and is available in 2", 4", and 6" sizes.

United Assoc., 1605 N. Hercules Ave., Clearwater, Florida.

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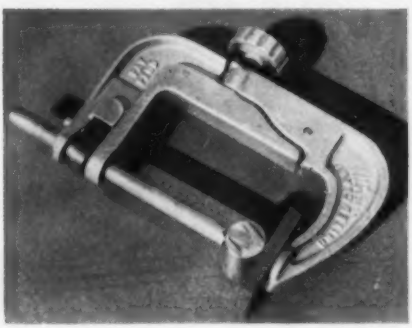

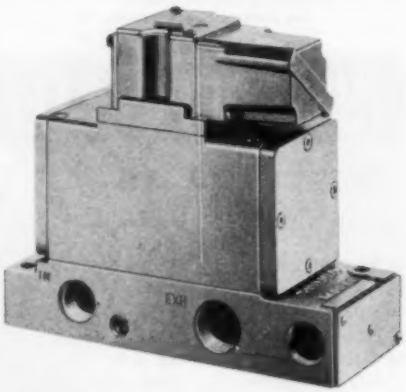

Pilot-Operated, Four-Way Air-Control Valve Line

A new line of four-way, pilot-operated air control valves offering both momentary and maintained contact electrical actuation models has been announced by the Hannifin Co.

The series HH air valves are available in 3/8", 1/2", and 3/4" pipe sizes with side ported bases as standard. Many of the application limitations formerly present in pilot-operated valves are eliminated

The MARKET PLACE

Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. **Rates: $20 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.**

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54 Clinton St. YO 3-3090 Yonkers, N.Y.

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60c PER END up to and including ½" dia. 20c each ⅛" over ½". Send us your worn, dull or chipped end mills for like-new sharpening. We also sharpen and recondition Milling cutters, Woodruff Keyseat, and other cutting tools. Satisfaction guaranteed.
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4517 Milwaukee Ave. Chicago 30, Ill.

by the valve's broad 15 to 150 psi working capacity range.

Maximum time required after signal to fill a 12 cu. in. load chamber from 0 to 90 psi is .029 sec. for the ½" valve. This speed is the result of the valve's exceptionally fast shift and large flow capacity.

Hannifin Co., 501 S. Wolf Road, Des Plaines, Ill.

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Handle Wrench

The Hex "T" handle wrench used for hex socket screws, makes tightening of hex screws in deep, hard-to-reach recesses or counterbores easy, according to its manufacturer, Bowersox Precision Castings, Inc. This wrench has a die cast zinc alloy handle, and sizes range from 5/64" to 5/8". The bit size is cast on each wrench. They may be bought in sets or individually.

Bowersox Precision Castings, Inc., Chester, Pa.

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INSTRUMENT SIZES

The more exacting the work, the more you will appreciate the precision and lasting performance of Briney Bushings. No other maker offers such a comprehensive range of types and sizes . . . particularly in *instrument* sizes. And like all Briney Bushings, instrument sizes are not counterbored. They have full bearing full length to support and guide the drill. Made by The Jig Bushing Company, Pontiac, Michigan. Sold by Leland-Gifford.

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Sid Tool Company

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HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD
00	96
0	70-72-76-80
1	48-56-64-72-80-90
2	48-52-54-56-64-72-80
3	40-44-46-48-56-60-64
4	32-36-40-48-56-60-64 72-80
5	30-32-36-40-44-48-56-64-80
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HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4½-10-12

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with total eccentricity of shaft less than fifty millionths (.000050")

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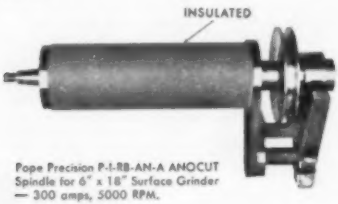
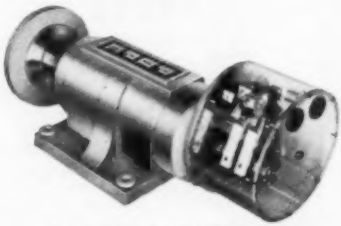
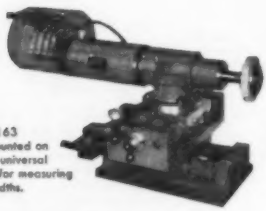


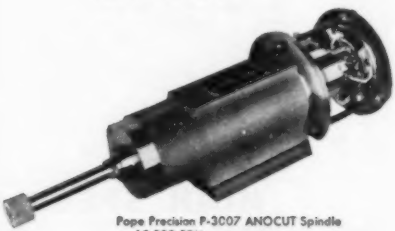
Pope Precision P-1-RB-AN-A ANOCUT Spindle for 6" x 18" Surface Grinder — 300 amps, 5000 RPM.



Pope Precision P-19162 ANOCUT Spindle; 1 to 20 HP, 1800 RPM.

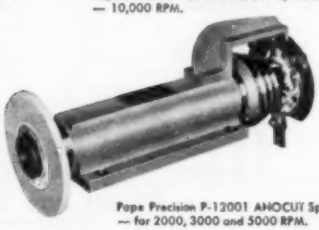


Pope Precision P-19163 ANOCUT Spindle mounted on Pope heavy duty universal slide with indicators for measuring feed in ten-thousandths.



Pope Precision P-3007 ANOCUT Spindle — 10,000 RPM.

Pope Precision P-6651-XG-S4 ANOCUT Tilting Head for attaching to Cincinnati #2 Tool and Cutter Grinder.



Pope Precision P-12001 ANOCUT Spindle — for 2000, 3000 and 5000 RPM.

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Our National Purpose

National Purpose is not new. A great nation was founded by the men of Concord, who independently and individually wanted liberty but who could not realize their dreams without unified action. Heard around the world was not only a shot, but a declaration of National Purpose as well.

What's happened to our National Purpose over the years? Submerged! Almost smothered under woolly, stuffy apathy! Industrialization, wealth and productive strength have become opiates, and success has wafted us on a pink cloud into a world of gaudy peacocks. The other—the real world—is undergoing a second industrial revolution.

That same industrialization which has made our country great is taking place all over the globe. The world is on the march. Others would be great, would be wealthy, and are traveling our road with machines and technology. In this march we have helped. Rarely, in the history of man, has any nation given to others so much of itself, its skills, and its knowledge. This we do not regret. Greatness carries its responsibilities and wealth its obligations. And now that others have shared our bread and are strong, we neither condemn nor regret. If we are weakened, it is less from having given than from resting too long.

Alas, history moves faster than we think. Today, a nation becomes industrially mighty in less than ten years instead of 100 years, and becomes a second-rate power just as quickly. Here let us take warning! World industrialization, plus American obsolescence and apathy, means eventually total economic engulfment.

The mere replacement of equipment is not enough. What is needed, in addition, is a National Purpose. The cold realization that those things which need doing to meet world-wide competition are being done because it is a national necessity, that the welfare of the nation depends on this. Personal interests must rise to the highest level of national consciousness. Our eyes must be lifted up and the feeling of greatness and unity be reached at a height far above the immediate competitive advantage level. This we must do. We can do no less. It is late. It is late!

Wm. F. Schleicher

Publisher & Vice President

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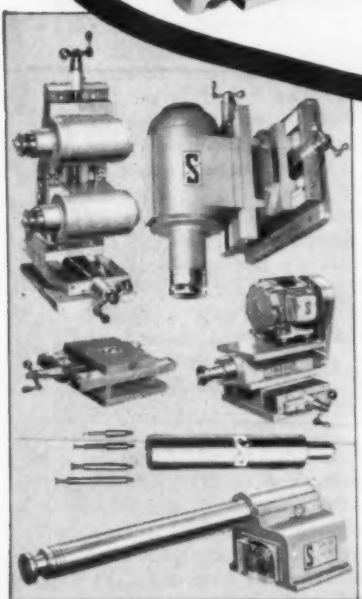

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